Annual Research & Review in Biology

36(8): 70-81, 2021; Article no.ARRB.72215
ISSN: 2347-565X, NLM ID: 101632869

Multivariate Analysis of Blood Pressure and Body Mass Index (BMI) for the Aged in Calabar South: The Counselors Intervention Strategy on Awareness Creation on Stress Related Disorder

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ARRB/2021/v36i830412
Editor(s):
(1) Dr Paola Angelini, University of Perugia, Italy.
Reviewers:
(1) John Ogedengbe, University of Abuja, Nigeria.
(2) Savita Hulamani, Karnataka State Akkamahadevi Women's university, India.
Complete Peer review History: https://www.sdiarticle4.com/review-history/72215

Original Research Article

Received 24 May 2021
Accepted 03 August 2021
Published 13 August 2021

ABSTRACT

Multivariate analytical study was carried out for the blood pressure (BP) indicators and body mass indices (BMI) for the aged in Calabar South Local Government area of Cross River State, Nigeria using the systolic, diastolic and pulse rate and for weight over the square of heights as indices for stress related disorders. The research focuses on multivariate analysis using principal component analysis, factor analysis, Cronbach's alpha statistics, biplot analysis, matrix plot, linear trend model and Turkey's multiple comparative statistics between age, blood pressure and body mass index among the aged of 60 – 90 years. The study evaluated one hundred and twenty aged people separated into six groups based on age. Appropriate equipment and tools were used to measure the systolic and diastolic blood pressures and pulse rates. The body mass index was determined using weight over square of height (kg/m^2). The data generated was analyzed using multivariate statistical analysis of Minitab v17 statistical software. The results revealed that all six age brackets evaluated

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for the aged showed 66- 70 and 81 -85 yrs showed pre –obese conditions while the other four age brackets showed obese class 1 hypertension respectively. The results further showed that five principal components accounted for 100 percent of total variations in BMI and BP for the aged in the study area with principal component one (PC1) with eigen value of 0.398 contributing 56.90% to the observed total variation. The principal loading variable for this component was obtained from pulse rate (0.470). A trend linear model of Yt = 23.94 + 1.233 x t was obtained for the trend analysis indicating the high dependence of the BMI and BP (Y) on age (t). The results of Cronbach's alpha statistics revealed a high level of low precision and high standard errors among all variables evaluated showing less than 70 percent. The Turkey's multiple comparative analysis revealed high level of inconsistency among the variables as we compared one variable to another. The counselor's intervention strategy focuses on the creation of awareness on the need for a regular and routine blood pressure check - up for the aged, the need to create awareness on the potential risk factors that predisposes aged to increased blood pressure and pulse rates, the need for urgent guidance and counseling program for the aged on the dangers of drug abuse, smoking and poor dieting and the need for government safety nets intervention program for the aged to reduce increasing stress related disorders which is highly prevalence among the aged in the area.

Keywords: Stress related disorders; hypertension; breathing rate; principal components; loading values; trend model.

1. INTRODUCTION

Multivariate statistics is a subdivision of statistics encompassing the simultaneous observation and analysis of more than one variable like weight, height, systolic blood pressure, diastolic blood pressure, pulse rate and body mass index for the aged. Multivariate statistics concerns itself and help us to understand the different aims and background of each of the different aforementioned variables of multivariate analysis and how they relate to each other [1]. Multivariate analyses are widely employed in the evaluation and collection of statistical data to clarify and explain relationships between different variables such as the ones evaluated in the current study that are associated with targeted audience and parameters [2].

Blood Pressure (BP) is a measure of the force of blood flowing against the walls of the arteries. The blood pressure readings have two numbers which is indicated as 119/79 mmHg for example and representing the Systolic/Diastolic or SYS/DIA measurement. Blood pressure is an index for determining stress related disorders in humans like hypertension and obesity [3].

Body mass index (BMI) is a simple index of weight – for – height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). The BMI is also a very important indicator for measuring and determining stress related disorders in humans especially classes of hypertension and obesity status [4].

Stress related disorders are non-pathogenic diseases which are occasioned by increased blood pressure and abnormal body mass indices. These variables are quantitatively determined and hence the need to statistically analyzed them using the multivariate approaches. The high rate of dependency of increased stress related disorders makes the study of extreme importance [5].

Diseases are a lack of a healthy state of life, a disorder or illness caused by infections, genes defects and life style rather than by accident. Medically disease is defined as any deviation from or interruptions of the normal structure or function of any body part, organ or system that is manifested by a characteristic set of symptoms and signs and whose etiology, pathology and prognosis may be known or unknown [6]. Stress related disorders or disease is said to have caused over three hundreds million illnesses and over five million deaths against accident and other causes of death. For being the number one killer, conquering heart related diseases is given premium in the scale of preference of the quest to conquer nature in human search for reliable knowledge which is the immediate concern of scientific investigations [7]

The aged in the study area comprises of old people who are above the productive age brackets (18 – 59 years) in a developing economy as that of Nigeria [8]. They fall within the dependent age and as such are prone to severe discomfort, hardship, hunger and maltreatment [9]. Most people in this age

brackets are retirees who passed through serious challenges to get their pensions and gratuity for their upkeep [10]. This ugly scenario is the major cause of the increased stress related disorders amongst the aged in the area [11]. It is against this backdrop, that this study was set up to statistically analyze the concern variables to enable for the drawing of meaningful conclusions and developing counseling strategies that can mainstream and reintegrate the aged into the society to enable the youths and government benefits for their wealth of experience and advice.

2. MATERIALS AND METHODS

2.1 Research Area

The study on the multivariate analysis of body mass index with incidence of hypertension and diabetes for the aged was carried out at Nsidung, Calabar South LGA, of Cross River State. The aged were the elderly people who were above 60 years of age in the study area.

2.2 Study Population

The study population consisted of 120 Aged respondents resident in Calabar South Local Government Area were studied. The Aged respondents were divided into six age brackets of twenty (2) each as follows;

(i) 61 – 65 yrs designated as A1
(ii) 66 – 70 yrs designated as A2
(iii) 71 – 75 yrs designated as A3
(iv) 76 - 80 yrs designated as A4
(v) 81 – 85 yrs designated as A5
(vi) > 86 yrs designated as A6

Twenty (20) aged respondents were randomly selected from each age brackets and used for the study. The respondents age was ascertained through questionnaire and birth related document. Both sexes of the respondents were used for the study.

2.3 Blood Pressure

Blood Pressure is a measure of the force of blood flowing against the walls of the arteries. The blood pressure readings have two numbers which is indicated as 120/80 mmHg (Systolic/Diastolic or SYS/DIA). A single measurement of blood pressure does not provide an accurate indication of the true blood pressure. Hence the need to repeat measurements at specific time interval is ideal as done in the present study.

2.4 Measurement of Systolic and Diastolic Blood Pressure

The systole is the highest pressure in the cycle which is called the systolic blood pressure. This blood pressure is necessary to enable the evaluation of blood pressure status by healthcare professionals. The OMRON M2 Automatic Upper Arm Blood Pressure Monitor (Intellisense) for all health care was used in the determination of systole in mmHg. It is a clinically validated – intellisense technology which ensures accurate and comfortable measurement of content. Vietnam: Model (code): M2 (HEM-1721-E) with irregular heartbeat detection inbuilt meter. It ranges from 20 – 300 mmHg, with increasing risk of heart diseases as value increases. This measurement was repeated thrice at three days interval and the means taken for the different age brackets used in the study.

The diastole is the lowest pressure in the cycle which is called the diastolic blood pressure. This blood pressure is necessary to enable the evaluation of blood pressure status by healthcare professionals. The OMRON M2 Automatic Upper Arm Blood Pressure Monitor (Intellisense) for all health care was used in the determination of diastole in mmHg. It is a clinically validated – intellisense technology which ensures accurate and comfortable measurement of content. Vietnam: Model (code): M2 (HEM-1721-E) with irregular heartbeat detection inbuilt meter. It ranges from 1 - 150 mmHg, with increasing risk of heart diseases as value decreases. This measurement was repeated thrice at three days interval and the means taken for the different age brackets used in the study.

2.5 Measurement of Pulse Rate

This is the measurement of heart beats per minute. The OMRON M2 Automatic Upper Arm Blood Pressure Monitor (Intellisense) for all health care was used in the determination of diastole in mmHg. It is a clinically validated – intellisense technology which ensures accurate and comfortable measurement of content. Vietnam: Model (code): M2 (HEM-1721-E) with irregular heartbeat detection inbuilt meter. it displays 40 to 180 beats/min. This measurement was repeated thrice at three days interval and the means taken for the different age brackets used in the study.

2.6 Measurement of Weight (kg)

The weights of ten (10) Aged respondents in the different age brackets were measured in kilograms using a manual weighing balance. Each respondent was made to climb the balance and the weight as displayed in the balance meter was recorded in kilogram and the average for each age bracket extrapolated and tabulated (Table 2).

2.7 Measurement of Height (m)

The heights of ten (10) Aged respondents in the different age brackets were measured in meters using a meter rule. Each respondent was made to stand beside the meter rule and the height was read perpendicular to the respondent head from the meter rule which was recorded in meters and the average for each age bracket extrapolated and tabulated (Table 2).

2.8 Determination of Body Mass Index (BMI)

Body mass index (BMI) is a simple index of weight – for – height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). The mean weights and the heights measured from each of the respondents age brackets were used in the determination of the body mass index for each group. The BMI was tabulated in Table 2.

BMI = weight (kg)/ Height x Height (m^2)

Body mass index (BMI) is a simple index of weight – for – height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2).

2.9 Data Analysis

The data generated from the measurement of systoles, diastoles, pulse rates, weights, heights and calculation of body mass indices for all the age brackets. The Minitab V 17 statistical software was used to analyze for the correlation coefficients, regression analysis, comparative components analysis distribution of the identified parameters. The blood pressure chart was used to interpret blood pressure results for the different age brackets while the indicator Table 3 was used interpret the body mass index.

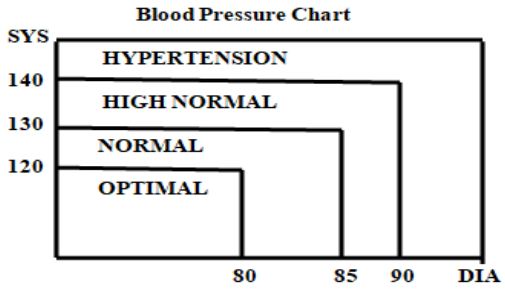

Fig. 1. Blood pressure chart

3. RESULTS

3.1 Blood Pressure Indicators and Body Mass Index of the Aged in Calabar South

The results of blood pressure indices including the systolic, diastolic and pulse rate and body mass index and its parameters measured and obtained from the aged respondents according to their age brackets are presented in Table 2. The results reveals that the youngest age bracket evaluated was 61 – 65 years while fisher folks between 96 years and above was the highest age bracket. The highest mean systolic blood pressure of 139 mmHg was obtained from the 81 - 85 yrs age bracket and the least mean systolic blood pressure of 127 mmHg was obtained from the 66 – 70 yrs category. The highest mean diastolic blood pressure of 99 mmHg was obtained from the 81 - 85 yrs age bracket and the least mean diastolic blood pressure of 64 mmHg was obtained from the greater than 86 yrs category. The smallest mean Pulse rate of 59 heartbeats per minutes was obtained from the >86 yrs age bracket while mean of 79 heartbeats per minute was obtained from the 71 – 75 yrs cadre respectively (Table 2).

Results of body mass index as presented in Table 2 revealed that only the age bracket of 61 - 65 yrs have a mean BMI of 31.39 kg/m^2 that falls within the obese class 1 range of health status (Table 2 and Fig. 1). The 66 – 70 yrs and the 71-75 age brackets showed mean BMI of 25.67 kg/m^2 and 30.51 kg/m^2 indicating pre-obese and obese class I health status conditions respectively. The 76 – 80, 81 – 85 and above 86 yrs categories showed BMI of 31.56 kg/m^2, 27.42 kg/m^2 and 30.46 kg/m^2 respectively revealing an

obese Class 1, pre-obese and obese class 1 hypertension status (Table 2 and Fig. 1).

3.2 Principal Component Analysis of Blood pressure indicators and Body Mass Index

The results of principal component analysis of blood pressure indicators and body mass index of the aged in Calabar south is presented in Table 3. The results indicated that the systole, diastole, pulse rate, weight, height, age and body mass index (BMI) delineated the principal components into five (5) with all components contributing 100 % to the total variations observed in the blood pressure indicators and body mass index of the aged in the study area. Principal component (PC1) one had the higher impact on the total observed variability contributing more than half (56.90%) to the total variations. The eigen value for this component is 3.9846 with the major loading value of 0.470 coming from reduced pulse rate of the aged. Principal component (PC2) two showed an eigen value of 1.7449 and contributed only 24.90% to the observed total variations.

The principal loading value for this component of 0.565 was contributed by the weight of the aged. The eigen value for principal component (PC3) three is 1.1292 and a percentage contribution of 16.10% to the observed total variations among the aged (Table 3). The major loading value for this component is 0.528 and solely contributed by Body mass index (BMI). Principal component (PC4) four had an eigen value of 0.1290 with a contribution of 1.80% to the overall observed variations. The major loading value of 0.515 came from pulse rate of the aged. The last principal component (PC5) five showed an eigen value of 0.0123 with a small percentage contribution of 0.20% to the observed total variations. The principal loading value of 0.761 to this component was contributed by systolic blood pressure indicator for the aged (Table 3). The trend of the eigen values for the principal components are presented in Fig. 3.

3.3 Biplot of Blood Pressure Indicators and Body Mass Index of the Aged in Calabar South

The biplot of the blood pressure indicators and body mass index for the aged in the study area revealed that all the multivariate variables determined in the study were aligned in two major components as showed in Fig. 2. All the multivariate lies within the positive axis only above zero. The results indicated that all multivariate were positive for age, systole, diastole, BMI, weight, height and pulse rate. None lies on the negative axis of the biplot indicating significant variability among the indicators evaluated for the aged in the study area (Fig. 2).

The results of trend analysis plot for body mass index of the aged in Calabar South revealed a linear trend model of $Yt = 23.94 + 1.233 \times t$. The trend revealed a linear model for body mass index Y with age t. The results showed that the body mass index is actually dependent on the weight and height of the aged in the study area.

Table 1. Indications and classification of BMI (kg/m2)

S/N	Classification	Principal –cut-off point	Additional cut-off points
	Underweight	< 18.50	<18.50
	Severe thinness	<16.00	<16.00
	Moderate thinness	16.00 – 16.99	16.00 - 16.99
	Mild thinness	17.00 – 18.49	17.00 – 18.49
	Normal Range	18.50 – 24.99	18.50 – 22.99
			23.00 – 24.99
	Overweight	>25.00	>25.00
	Pre-obese	25.00 – 29.99	25.00 – 27.49
			27.50 – 29.99
	Obese	>30.00	>30.00
	Obese Class I	30.00 – 34.99	30.00 – 32.49
			32.50 – 34.99
	Obese Class II	35.00 – 39.99	35.00 – 37.49
			37.50 – 39.99
	Obese Class III	>40.00	>40.00

Table 2. Results of average blood pressure measurements and body mass index determination for the Aged in Calabar south LGA of CRS

S/N	Age bracket of respondents (yrs)	Systole (mmHg)	Diastole (mmHg)	Pulse rate	Weight (kg)	Height (m)	Body Mass Index (BMI) kg/m^2	Remarks
1	61 – 65 (A1)	132	92	73	82	1.63	31.39	Obese Class I
2	66 – 70 (A2)	127	88	69	76	1.72	25.67	Pre-obese
3	71 – 75 (A3)	134	90	79	83	1.65	30.51	Obese class I
4	76 – 80 (A4)	137	89	71	89	1.68	31.56	Obese Class I
5	81 – 85 (A5)	139	99	60	65	1.54	27.42	Pre-obese
6	>86 (A6)	136	64	59	53	1.32	30.46	Obese class I

Table 3. Principal component analysis: BMI, systole, diastole, weight, height, pulse rate, age

Eigenvalue		**3.9846**	**1.7449**	**1.1291**	**0.1290**	**0.0123**
Proportion		56.9	24.9	16.1	1.8	0.2
Cumulative		56.9	81.9	98.0	99.8	100
	Variable	PC1	PC2	PC3	PC4	PC5
1	BMI	-0.223	0.525	0.528	0.238	0.045
2	Systole	-0.432	0.267	-0.325	-0.222	0.761
3	Diastole	0.147	0.452	-0.681	0.504	-0.215
4	Weight (kg)	0.307	0.565	0.219	-0.334	-0.100
5	Height (m)	0.459	0.242	-0.149	-0.511	0.026
6	Pulse rate	0.470	0.013	0.267	0.515	0.509
7	Age	-0.465	0.268	0.102	0.047	-0.321

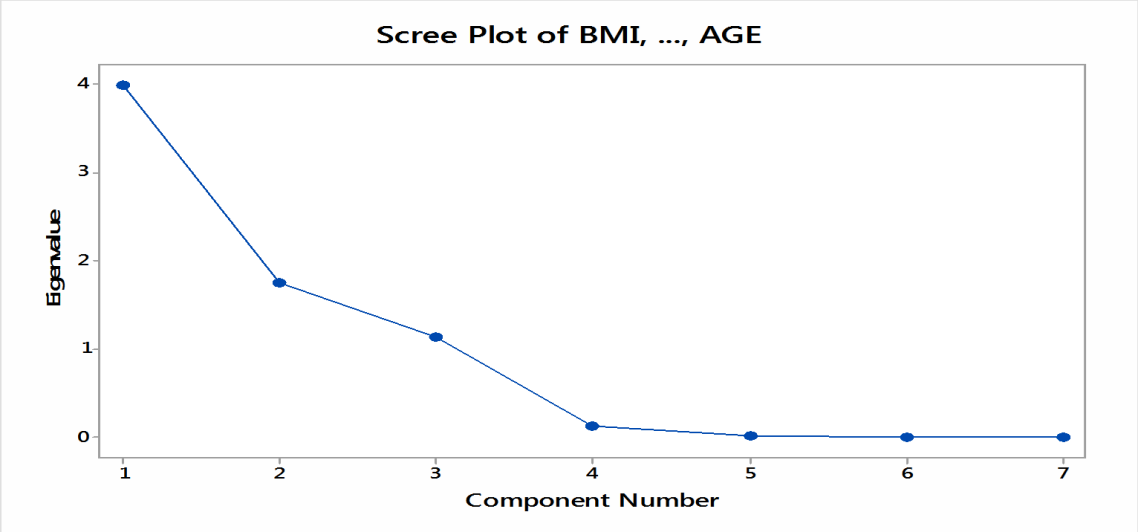

Fig. 2. Scree Plot of eigen values for Body mass index and blood pressure indicators against principal components

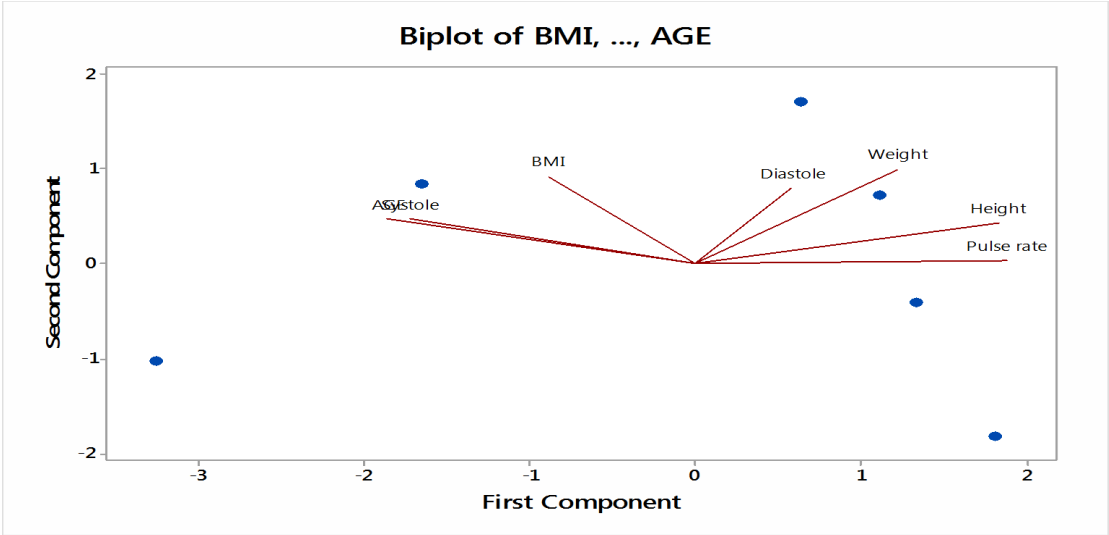

Fig. 3. Biplot of body mass index and blood pressure indicators with age

The results of item analysis for adjusted variables of body mass index and blood pressure indicators as presented in Table 5 revealed the highest adjusted total mean of 449.08 m of height was adjusted for the 81– 85 yrs aged people, while the least adjusted variable with total adjusted mean of 326.51 mmHg systole was adjusted for the 66 – 70 yrs aged people. The total adjusted standard deviation of 27.49 mmHg for pulse rate was adjusted for aged people above 85 yrs old. The smallest standard deviation of 19.84 kg weight was adjusted for the 76 – 80 yrs aged people in the study area. The total corrected variables were negative for systole, pulse rate and age assuming values of – 0.1148, -0.1439 and -0.1310 respectively. The results of Cronbach's Alpha for all the adjusted variables were an indication of bad measures as all variables had Cronbach values of less than 0.70. This further suggests a high level of inconsistencies of the internal variable after adjustment. The sets of measurement for the different variable indicators were widely apart without consistency a low degree of precision and accuracy.

Fig. 5 presents the results of matrix plots for body mass index, systole, diastole, weight, height, pulse rate and different age brackets for the aged. The results showed similar trends of

BMI with pulse rate, height, weight and diastole. Similar trend of systole was observed with diastole, weight and height. Same observation and patterns of diastole was observed with weight and height. There were no similar trends in weight with other parameters as well as height and pulse rate.

The results in Table 3 represents the comparative study of the body mass index and blood pressures indices for the six different age brackets classified for the aged in the study area. The multivariate analysis reveals that there was significant ($p<0.05$) differences in body mass index among age brackets A6 and A5 age brackets of the aged studied. A similar result was obtained from the same age brackets A5 and A6 in the blood pressure test comparison which collaborated with the pairwise multiple comparisons in the BMI (Table 5)..

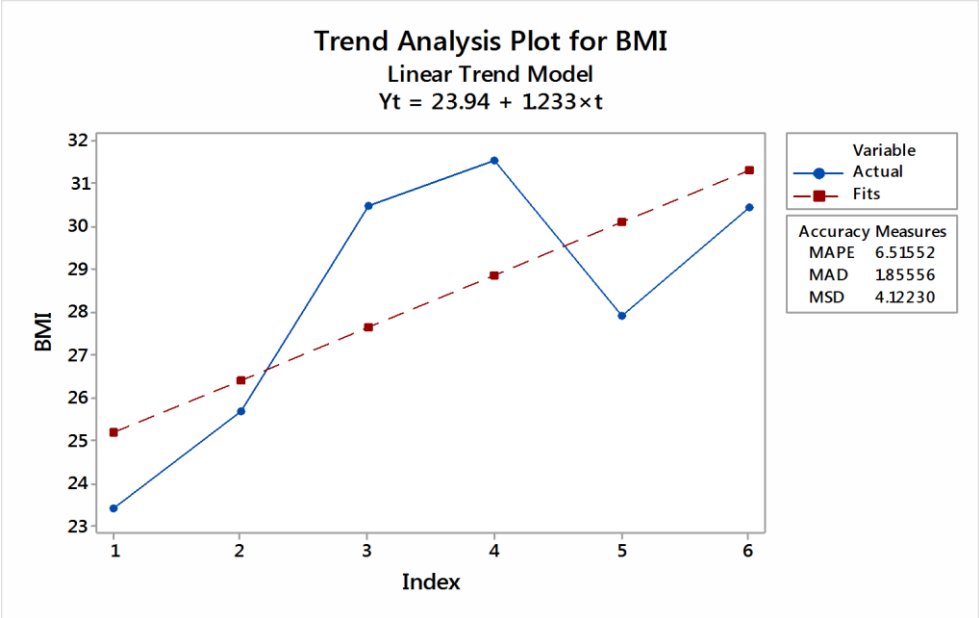

Fig. 4. trend analysis plot for Body mass index for the aged in Calabar South

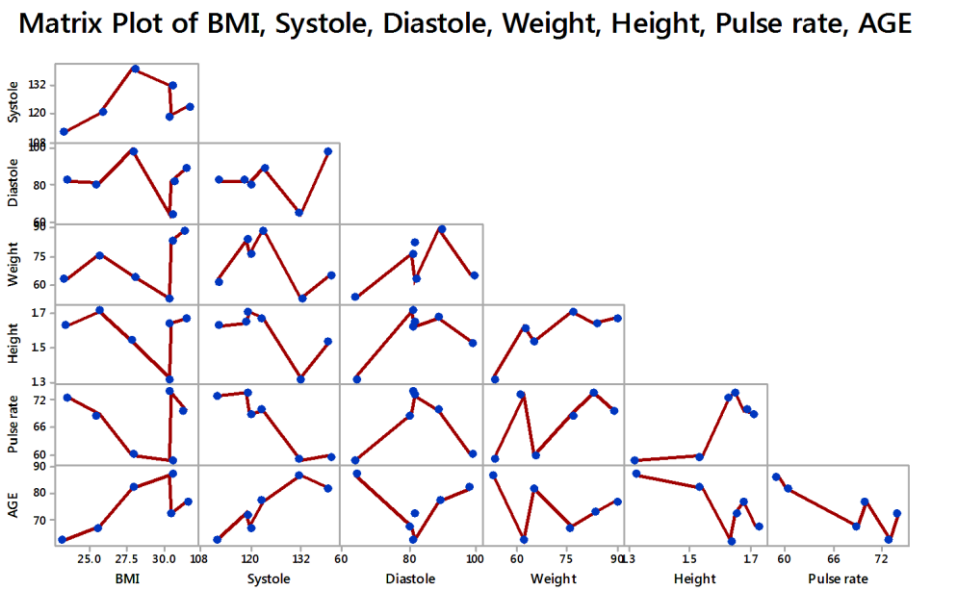

Fig. 5. Matrix plot of body mass index and blood pressure indicators

Table 4. Item analysis of adjusted variables items of BMI and Blood pressure indicators

Variable	Adj. total mean	Adj. total Std. dev.	Item –adj. total correlation	Squared multiple correlation	Cronbach's Alpha	Std. dev.	Age bracket
BMI	422.42	29.64	0.339	0	0.1716	3.20	61- 65
Systole	326.51	24.14	-0.1148	0	0.4401	9.75	66 – 70
Diastole	367.84	20.22	0.4010	0	0.1242	11.48	71 – 75
Weight	379.34	19.84	0.6762	0	-0.0916	13.66	76 – 80
Height	449.08	26.44	0.1629	0	0.2833	0.15	81 – 85
Pulse rate	383.18	27.49	-0.1439	0	0.4548	6.47	> 85
Age	375.68	24.78	-0.1310	0	0.4483		

*NOTE * Cronbach's alpha and omitted-variable correlations calculated with standardized data.*

Table 5. Comparative analysis of observation of BMI and BP test results amongst six age brackets for the aged in Calabar south (Turkey Pairwise Multiple Comparison Procedures Test)]

BMI TEST				BP TEST			
Comparison	**Diff of Ranks**	**Q**	**P<0.05**	**Comparison**	**Diff of Ranks**	**Q**	**P<0.05**
A2 vs A1	101.5	5.31	No	A4 vs A6	252	3.98	Yes
A2 vs A3	184.2	3.74	No	A4 vs A5	198.2	2.75	No
A2 vs A4	184.5	3.92	Yes	A4 vs A3	134.8	2.55	Yes
A2 vs A6	132.3	3.946	No	A4 vs A2	124.1	1.67	No
A2 vs A5	502.5	2.05	No	A4 vs A1	301.3	1.54	No
A5 vs A1	199.3	5.26	Yes	A1 vs A6	110.5	3.76	Yes
A5 vs A3	281.1	2.91	No	A1 vs A5	130.4	3.96	No
A5 vs A4	108.2	2.64	No	A1 vs A3	176.5	2.44	No
A5 vs A6	630.5	4.89	Yes	A1 vs A2	213.5	2.78	No
A6 vs A1	269.4	5.35	Yes	A2 vs A6	197.2	2.45	No
A6 vs A3	151.1	1.68	No	A2 vs A5	137,8	1.95	No
A6 vs A4	152.3	3.84	No	A2 vs A3	113.5	1.15	No
A4 vs A1	211.7	4.22	Yes	A3 vs A6	233.5	2.71	No
A4 vs A3	169.3	1.74	No	A3 vs A5	173.5	1.81	No
A3 vs A1	117.4	3.67	Yes	A5 vs A6	660.6	4.82	Yes

4. DISCUSSION

Guidance and genetic counseling and interventions will help tremendously in reducing exposures and risk factors of obesity associated with wide variety of common diseases of public health importance including hypertension, diabetes and obesity. The aged are experienced people with great wisdom who should continue to pass on their wealth of experience to the young ones for a better society. The early detection and identification of predisposing factors and subsequent treatment of early symptoms is possible to prevent, control and eliminate stress related diseases in among the aged in Calabar south will save life and reduce human mortality in the area and which have remained invaluable in public health assessment worldwide [12,13].

The results revealed that all six age brackets evaluated for the aged showed 66- 70 and 81 -85 yrs showed pre –obese conditions while the other four age brackets showed obese class 1 hypertension respectively. The results further showed that five principal components accounted for 100 percent of total variations in BMI and BP for the aged in the study area with principal component one (PC1) with eigen value of 0.398 contributing 56.90% to the observed total variation. The principal loading variable for this component was obtained from pulse rate (0.470). A trend linear model of $Yt = 23.94 + 1.233 \times t$ was obtained for the trend analysis indicating the high dependence of the BMI and BP (Y) on age (t). The results of Cronbach's alpha statistics revealed a high level of low precision and high standard errors among all variables evaluated showing less than 70 percent. The Turkey's multiple comparative analysis revealed high level of inconsistency among the variables as we compared one variable to another. This is in line with the reports of [14,15].

Stress related disorder simply manifest in obesity, hypertension, stroke and other cardiac related ailments. Obesity is a health condition presented in the form of excessive fat in humans. It occurs when calories intake exceeds calories expended over an extended period of time. It some cases it is hereditary. Obesity is also the presence of large amount of fat in the subcutaneous tissues of the body. Mean values of body fat in the total body weight for normal young men is about 12% and for young women about 26% [16]. A man whose body fat amounts to over 20% of his total body weight may be considered obese and for women with figure of over 40% is an indication of obesity.

Obesity in this regards is multidimensional due to the high calorie intake which exceeds calorie expenditure (i.e over consumption or under expenditure of energy or frequently a combination of both). Over indulgence in sugary foods like cakes and chocolates and starchy foods like bread and biscuits as well as excessive or high intake of fatty foods [17,18].

The risk factors of obesity include bad eating habits involving the continuous nibbling of food and abuse of alcohols and smoking. Physical activity and exercise – obesity is common with those people who live sedentary lifestyle like the aged than active individuals [19,20].

Obesity has many health and social implications. Obesity predisposes individuals to diabetes, cancer, cardiovascular diseases, dental cares, etc. it may also lead to barrenness in females and hypertension in pregnant women. Life expectancy decreases by up to 25 % in some cases. The social implication includes wearing of unfashionable clothes, shyness and job preferences as also reported by [20].

Preventive measures will entails calorie restriction, regular exercise, use of drugs e.g. appetite de-stimulatory drugs, and medical supervision [21]. Healthy diet with ample fibre, low in refined sugar, high in complex carbohydrates and moderate proteins are preventive measures. Others include regular exercise, weight reduction and refraining from habits like smoking and alcohol abuse which intake is very high and prevalent among the aged [5,6,21].

5. CONCLUSION

The study had shown that the aged displayed exceptionally high blood pressure indices and body mass index which revealed pre-obese and obese class 1 for all the age brackets evaluated for the aged. These conditions of health status for the aged in the Calabar south also showed increasing stress related disorders among the aged. The linear trend model adopted in the study had revealed a high dependency of the body mass and blood pressure indices to rely heavily on increasing ages of the respondents. The Cronbach's Alpha analysis revealed very low precision and accuracy among the evaluated blood pressure and BMI variables for the aged. The Turkey's comparative model analysis for the BMI and blood pressure indices for the aged revealed a highly significant difference especially

among the last age brackets evaluated. Hence, due to the increasing health risk associated with increasing body mass index with age, there is need to counsel the aged and seek for meaningful interventions for the aged from government, donor agencies, NGOs and well-meaning individuals to intervene and reduced stress related disorders among the aged in Calabar South Local Government Area of Cross River State.

5.1 Counselor Intervention Strategy

i. Creation of awareness on the need for a regular and routine blood pressure check - up for the aged by their caregivers..
ii. Create awareness on the potential risk factors that predisposes the aged to stress related disorders, like hypertension and obesity.
iii. Engage Government on the need to ensure prompt payment of retirement benefits and pensions to the aged retirees to reduce increasing blood pressure and stress related disorders arising from untold economic hardship for the aged retirees.
iv. The need for urgent guidance and counseling of the aged on the dangers of drug abuse, smoking and poor dieting which predisposes them to stress related disorders.
v. Advice government on the need for safety nets intervention program for the aged to forestall increasing cardiac associated disorders that is highly prevalence among the aged.
vi. Interact with Non-Governmental Organizations to assist in reaching out to the aged in the study area to reduce stress related disorders and heart diseases.
vii. Prevail on Donor agencies to strengthen and provide livelihood sources like conditional cash for the aged to reduce stress related disorders which predisposes them to high blood pressure.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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