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Evaluation of Cardiovascular and Atherogenic Profile Patterns amongst Senior Staff of a Rivers State Tertiary Institution

Tamuno-Opubo, A.[1*], Stanley, R. O.[2], Wilson T. O.[3], Ogbonda, P. N.[4], Gbaranor, B. K.[1], Imbu, B. I.[4]

[1]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medicine, Rivers State University, PMB 5080, Port Harcourt. Rivers State, Nigeria
[2]Department of Internal Medicine University of Port -Harcourt, Teaching Hospital, Port Harcourt
[3]Department Food Nutrition and Home Science, University of Port Harcourt Choba, Rivers State, Nigeria
[4]Department of Public Health Sciences, Faculty of Basic Medical Sciences, Rivers State University. Nigeria

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***Corresponding author:** Tamuno-Opubo, A.
Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medicine, Rivers State University, PMB 5080, Port Harcourt. Rivers State, Nigeria

Abstract **Original Research Article**

A key approach in the prevention of cardiovascular and other related metabolic disorders amongst the workforce requires in depth research in to cardiovascular risk factors amongst workers and their classification by employment type. Thus, the present study sets out to evaluate cardiovascular and atherogenic profile patterns amongst senior staff of a Rivers State tertiary institution. The cross-sectional survey method was adopted to recruit different categories of the study subjects. The data on the participants were obtained with the use of well-structured proforma as well as globally accepted standard procedures. The quantitative data retrieved from the study participants were statistically analysed using version 25.0 of the IBM Statistical Product and Service Solutions (SPSS) software. The study found that the age distribution of the two subgroups of the study were within their middle-ages. In another related finding by the present study, it was noted that, the BMI value of the male academics was seen to be significantly ($p<0.05$) reduced with respect to that of their non academic counterparts. There were no significant ($p>0.05$) changes in the BMI values amongst the female subjects. Considering the outcome of the evaluation on blood pressure, the SBP, DBP and MAP mean values in the academics were found to be comparatively elevated; this was remarkable ($p<0.05$) for DBP in the male academics and DBP and MAP in the female academics. The outcome of the study on lipid profile of the academics had marginal changes ($p>0.05$) in the lipid profile with comparative elevations in TC levels. The results on AIP, AC and CRI-1 changes were relatively lower in the academics. In conclusion, the findings of the present study, indicates the need for lifestyle moderation, especially in the non-academics and the academicians alike to avert the tendency for incidence of cardiovascular disorders in this special sub-category of workforce.

Keywords: occupational health risk; blood pressure; university personnel; sedentary lifestyle; Rivers State.

INTRODUCTION

Sedentary behaviours have been described to be any activity that involves sitting, lying, or reclined postures with an energy expenditure of <1.5 metabolic equivalent tasks (Compernolle *et al.,* 2016). Sedentary behaviour has emerged as one of the most prevalent patterns of behaviour in contemporary society (Bennie *et al.,* 2013); adults engage in sedentary activities, such as working on a sitting position for a long time almost no breaks, working from home, spending leisure time in front of screens, and even using public transportation, for roughly one-third to one-half of their daily hours (Peng *et al.,* 2023). Furthermore, it has been established that sedentary individuals also have other hazardous lifestyle choices, such as irregular eating patterns (Carneiro-Barrera *et al.,* 2020), insufficient sleep (Kakinami *et al.,* 2017), and a lack of physical exercise (Ding *et al.,* 2022).

Notably, white-collar workers often lead sedentary lifestyles with more 80% of their workday spent sitting; of course, this greatly raise their risk of obesity, type 2 diabetes, cardiovascular disease, and musculoskeletal diseases. Implementing breaks, sit-stand desks, and active commuting is essential since prolonged sitting—typically more than 7.5 hours per day—worsens these health dangers (Gilson *et al.,* 2019; Biernat & Piątkowska, 2023). In a similar submission, it

was noted that, the high prevalence of cardiovascular disease (CVD) among university employees is associated with sedentary lifestyles, long hours, poor eating habits, and chronic work-related stress (Martín *et al.,* 2024).

It is worthy of note to state that, a key approach in the prevention of cardiovascular disorders amongst the workforce requires in depth research in to cardiovascular risk factors amongst workers and their classification by employment type (Joseph *et al.,* 2017). Thus, considering reported significant relationship between lifestyle and prevalence of cardiovascular conditions (Menotti *et al.,* 2015) the present study sets out to evaluate cardiovascular and atherogenic profile patterns amongst senior staff of a Rivers State tertiary institution.

MATERIALS AND METHODS

Study Design

The present study used the cross-sectional survey method to recruit different categories of the study subjects. Of course, this approach is suitable for evaluating prevalence, detecting trends, and analyzing several variables at once without the requirement for participant follow-up because they provide a quick and affordable way to collect data from a population at a particular point in time.

Study Area

The first state-owned institution in the Niger Delta and Nigeria's first technology university is Rivers State University (RSU). It is situated in Oroworuko-Nkpolu axis of Port Harcourt. It became a complete university in 1980 after being founded as a college in 1972. With an emphasis on technology, science, and professional studies, it was formerly known as the Rivers State University of Science and Technology before assuming its current name: Rivers State University.

Study Population

The study population was made up of senior staff (both teaching and non-teaching categories) of the Rivers State University. The subjects were fully employed personnel of the Rivers State University, Port Harcourt, Rivers State.

Sample Size and Sampling Methods

The convenience sampling tool, a non-probability sampling method, was chosen for this study. The rationale behind this decision included the availability of participants, limited time, and budgetary constraints. Given the occupational environment, the senior staff of the university were readily accessible, which allowed for a practical approach to participant recruitment. In all a total of 66 subjects, made up of 33 non-teaching personnel and 33 top teaching personnel (Academics) in Rivers State University were recruited into the research.

Eligibility Criteria

The inclusion criteria for recruiting the study subjects included individuals between the ages of 18 and 50 years, and willing / fully employed personnel of Rivers State University for up to one (1) year and above; meanwhile, the exclusion criteria involved individuals with a known history of cardiovascular diseases (e.g., heart disease, stroke), individuals who were at the time on lipid-lowering therapies (e.g., statins) and those with severe chronic illnesses (e.g., cancer, kidney disease) that could impact cardiovascular or lipid measurements.

Methods of Data Collection

The data on the participants were obtained with the use of well-structured proforma as well as globally accepted standard procedures. The investigation considered health status, duration of exposure and other demographic information. Trained and skilled research assistants were used to administer the proforma and obtain measurements and samples from the study participants. Following issuance of consent by the study participants, blood samples were got from the antecubital vessel by phlebotomists, by means of standard procedures.

Methods of Data Analysis

The quantitative data retrieved from the study participants were statistically analysed using version 25.0 of the IBM Statistical Product and Service Solutions (SPSS) software. Statistical significance was determined using one-way analysis of variance (ANOVA) and then followed by post-Hoc LSD multiple comparison test. A P-value less than 0.05 were taken to be statistically significant.

Ethical Consideration/Informed Consent

The approval for the present study was sought and obtained from the Research Ethics unit of the Department of Human Physiology, Faculty of Basic Medical Sciences, Rivers State University, Nigeria. Similarly, properly filled consent letter were received from the study participants prior to their inclusion to the study.

RESULTS

Here, the results of the present study are presented in tables and charts and were interpreted accordingly.

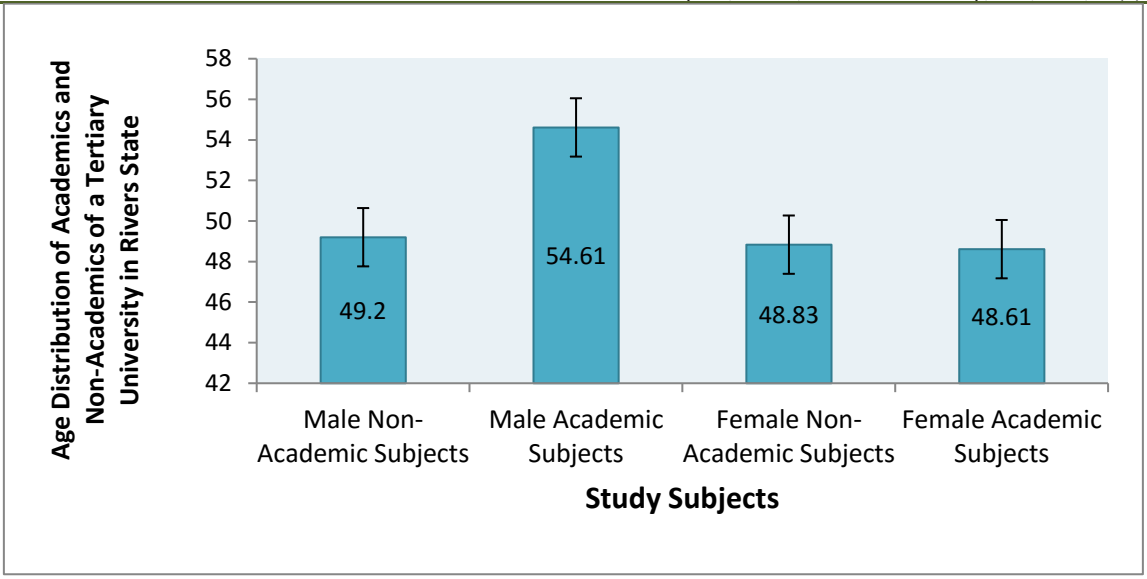

Figure 1: Age Distribution across Academics and Non-Academics of a Tertiary University in Rivers State

Values are expressed as Mean ± SD; n=30; *Significant at p<0.05 when male academics values are compared to that of male non-academics; **Significant at p<0.05 when male academics values are compared to that of male non-academics.

The data on Figure 1 represents the age distribution across academics and non-academics of a tertiary university in Rivers State.

The age distribution followed thus: male non-academics (49.2 years), male academics (54.61 years), female non-academics (48.83 years) and female academics (48.61 years). From the foregoing, it is obvious that the university executives are about their middle-ages.

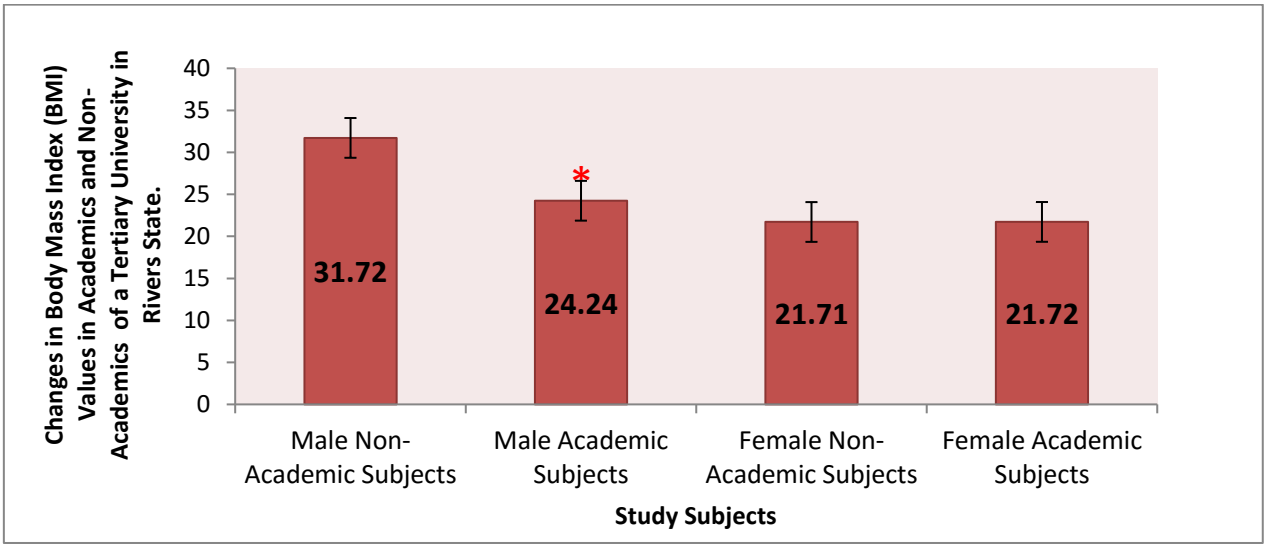

Figure 2: Comparison of Body Mass Index (BMI) Values between Academics and Non-Academics of a Tertiary University in Rivers State

Values are expressed as Mean ± SD; n=30; *Significant at p<0.05 when male academics values are compared to that of male non-academics; **Significant at p<0.05 when male academics values are compared to that of male non-academics.

Figure 2 shows the outcome on comparison of body mass index (BMI) values between Academics and Non-Academics of a Tertiary University in Rivers State. The BMI value of the male academics was seen to be significantly lower when compared to that of their non—academic counterparts. There was no significant changes in the BMI values amongst the female subjects.

Table 1: Comparison of Blood Pressure Parameters between Academics and Non-Academics of a Tertiary University in Rivers State

Parameters	Study Subjects			
	Male non-academics	Male Academics	Female non-academics	Female Academics
SBP (mmHg)	123.25 ± 20.33	130.61 ± 16.71	114.44 ± 7.84	128.06 ± 15.45
DBP (mmHg)	75.45 ± 12.23	86.13 ± 15.15*	69.44 ± 8.73	81.67 ± 11.88**
MAP (mmHg)	91.38 ± 13.87	100.86 ± 15.00	84.07 ±8.12	97.13 ± 12.65**

Values are expressed as Mean ± SD; n=30; *Significant at p<0.05 when male academics values are compared to that of male non-academics; **Significant at p<0.05 when male academics values are compared to that of male non-academics.

Table 1 represents the outcome on the comparison of blood pressure parameters between academics and non-academics of a tertiary university in Rivers State.

The SBP values in the academics were seen to be marginally ((p>0.05) higher when compare to those of their respective gender who are non-academics.

Concerning the DBP changes, the trend was similar to that of SBP but that of DBP indicated significant elevations in the academics when compared to that of the non-academics.

The MAP levels were as well higher in the academics compared to those of the non-academics but these elevations were only significant amongst the female values.

Table 2: Comparison of Lipid Profile Parameters between Academics and Non-Academics of a Tertiary University in Rivers State

Parameters	Study Subjects			
	Male non-academics	Male Academics	Female non-academics	Female Academics
Total Cholesterol (TC) (mmol/L) (3.5-6.8mmol/L)	3.01 ± 0.51	3.22 ± 1.02	2.99 ± 0.47	3.68 ± 0.87
Triglyceride (TG) (mmol/L) (0.68-1.58 mmol/L)	1.04 ± 0.20	0.80 ± 0.42	1.02 ± 0.20	1.14 ± 0.63
High-density lipoprotein cholesterol (HDL-C) (mmol/L) (0.8-1.8 mmol/L)	0.98 ± 0.17	2.11 ± 3.56	0.98 ± 0.16	1.65 ± 0.54
Low-density lipoprotein cholesterol (LDL-C) (IU/L) (1.8-4.0 mmol/L)	2.26 ± 0.30	1.76 ± 0.81	2.26 ± 0.29	2.04 ± 0.98

Values are expressed as Mean ± SD; n=30; *Significant at p<0.05 when male academics values are compared to that of male non-academics; **Significant at p<0.05 when male academics values are compared to that of male non-academics.

The data on Table 2 is the outcome on the comparison of lipid profile parameters between academics and non- academics of a tertiary university in Rivers State.

All lipid profile parameters evaluated by the present study were observed not to be significantly (p>0.05) variant. Although, TC and HDL-C levels in the male academics were comparatively higher with respect to that of their non-academic colleagues. Surprisingly, the LDL-C levels were non-significantly (p>0.05) lower in the academics compared to the that of the non-academics. The pattern of variations in the TG levels did not follow any particular trend.

Table 3: Comparison of Atherogenic Indices between Academics and Non-Academics of a Tertiary University in Rivers State

Parameters	Study Subjects			
	Male non-academics	Male Academics	Female non-academics	Female Academics
Atherogenic Index of Plasma (AIP) (-0.3 to.24)	2.26 ± 0.30	1.76 ± 0.811*	2.26 ± 0.29	2.04 ± 0.98
Atherogenic coefficient (AC) (>3.0)	2.08 ± 0.42	1.28 ± 0.99*	2.05 ± 0.44	1.41 ± 0.61
Castelli risk index (CRI-1) (>3.5)	3.08 ± 0.42	2.28 ± 0.99*	3.05 ± 0.44	2.41 ± 0.85

Values are expressed as Mean ± SD; n=30; *Significant at p<0.05 when male academics values are compared to that of male non-academics; **Significant at p<0.05 when male academics values are compared to that of male non-academics.

Table 3 shows the comparison of atherogenic indices between Academics and Non- Academics of a Tertiary University in Rivers State.

Interestingly, the atherogenic profile [(atherogenic index of plasma (AIP), atherogenic coefficient (AC) (Castelli risk index (CRI-1)] of the academics were seen to be generally lower in the academics than their non-academics. Notably, these reductions were significant ($p<0.05$) for the male academics when compared to their male non-academic counterparts.

DISCUSSIONS

University workers, teaching and non-teaching alike, have been posited to be exposed to hectic demands by their jobs; and the continuous or spontaneous nature of these demands have also been linked to a couple of health disorders including mental conditions and and non-communicable diseases (Dikgare, 2020). Engaging in voluminous academic activities comes with mental and physical stress which will in turn lead to varying deranged health conditions amongst them thus reducing their level of productivity; psychological stress limits the emotional stability of lectures and directly affects their health (Agunanne *et al.,* 2022).

Considering the fact that, optimal health has a essential role in facilitating individual and societal progress as well as enabling productivity (Wirnitzer *et al.,* 2023), the present study, thus, evaluated the cardiovascular function and atherogenic lipid profile of academic personnel in a tertiary institution situated in Port Harcourt. The main outcomes are discussed in the subsequent paragraphs.

It was recorded by the present study that the age distribution of the subgroups of the study were: male non-academics 49.2 years, male academics 54.6 years, female non-academics 48.83 years and female academics 48.61 years. It implied that the subjects were about their Middle Ages.

While such age could represent the prime age of huge productivity in terms of physically demanding jobs, it could also be associated with the onset of quiet a lot of non-communicable disorders (Kenny *et al.,* 2016; Saint-Martin *et al.,* 2018)). Thus, from the above finding of the present study, there would need for good health awareness and lifestyle moderations in such a population.

In another related finding by the present study, it was noted that, the BMI value of the male academics was seen to be significantly reduced with respect to that of their non—academic counterparts. There were no significant changes in the BMI values amongst the female subjects. This is a positive health attribute for the academics; as the BMI has a long-standing history of use with evidence for predicting disease risk (Han *et al.,* 2006). In fact, it has been said that a healthy BMI can help reduce the risk of developing serious health conditions, such as: heart diseases/high blood pressure, type 2 diabetes, etc (Nuttall, 2015).

This above finding is in tandem with the earlier submission of Haghani *et al.,* (2017) that stated how providing proper education about a healthy lifestyle could improve general lifestyle and reduction of weight. Thus, such normal BMI value of the academics may be linked to their level of enlightenment and exposure (Haghani *et al.,* 2017).

Considering the outcome of the evaluation on blood pressure, the SBP, DBP and MAP mean values in the academics were found to be comparatively elevated; this was remarkable for DBP in the male academics and DBP and MAP in the female academics. This outcome is an indication that the academics may be predisposed to hypertension and other associated disorders. The prevalence of chronic illnesses, especially non-communicable diseases (NCDs) is linked to high rate of mortality globally and this has increased despite advancements in medical knowledge (Wirnitzer *et al.,* 2023). So, more caution and lifestyle moderation may be very helpful for people at different social classes.

One of the patho-mechanism of hypertension involves a force of the blood pushing against the artery walls become consistently raised with the heart having to work harder in order to pump blood (Shrestha *et al.,* 2022). High blood pressure raises the risk of heart attack, stroke, and other major health issues if left untreated. Beginning at age 18, it's critical to have your blood pressure checked at least every two years. Some people require more frequent examinations.

Avoiding smoking, exercising, and maintaining a healthy diet are all examples of healthy lifestyle choices that can help prevent and treat high blood pressure. For the treatment of high blood pressure, some level require medication which is beyond mere lifestyle adjustments (Fuchs & Whelton, 2020). Therefore, academics in tertiary institutions must consciously monitor and possibly treat hypertension.

The outcome of the present study on lipid profile of the academics had marginal changes in the lipid profile with comparative elevations in TC levels. Thus, just like the outcome on the blood pressure parameters, academics must be weary in becoming predisposed to dyslipidemic conditions. Having too many lipids (cholesterol and triglycerides) in the blood can lead to buildup in your blood vessels and arteries, which can cause damage and increased risk of cardiovascular derangement (Goldberg, 2017).

The results on AIP, AC and CRI-1 changes were rather seen to be lower in the academics.

A vital component of human growth and fulfillment is health. According to Wirnitzer *et al*. (2023), optimal health is essential for both societal and individual advancement as well as for enabling effective responsiveness to exogenous factors.

CONCLUSION

From the findings of the present study, it can be concluded that, the surveyed academics were typically about their mean middle age indicating a very productive workforce that needs to be shielded from debilitating health conditions

Similarly, another related finding indicated that, the BMI value of the male academics was seen comparatively lower and within normal range, thus implying a positive health effect

Considering the outcome of the evaluation on blood pressure, the SBP, DBP and MAP mean values in the academics were noticed to be relatively raised; this was notable for DBP in the male academics and DBP and MAP in the female academics.

The outcome of the study on lipid profile of the academics had marginal changes in the lipid profile with comparative elevations in TC levels.

The results on AIP, AC and CRI-1 changes were relatively lower in the academics. This outcome corroborates with the earlier finding on lipid profile changes, thus indicating the need for lifestyle moderation to avert the tendency for incidence of cardiovascular disorders.

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