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The Relation of Occupational Status with Cardiovascular Risk amongst Apparently Healthy Adults in Port Harcourt City

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Abstract: *This study evaluates the relation of occupational status with cardiovascular risk of apparently healthy adults in Port Harcourt City. A total of 167 apparently healthy subjects were used for this study. The mean age of the subjects in this study was 38.92 ± 8.28 years. A structured administered questionnaire was used as an aid in the collection of demographic and lifestyle data from the subjects. C-reactive protein (CRP) and Lipoprotein phospholipase A_2 (Lp-PLA_2) levels were measured quantitatively by the sandwich-enzyme linked immunosorbent assay (ELISA) method. Total cholesterol (TC), triglycerides (TG), and high density lipoprotein cholesterol (HDL) were measured quantitatively by colorimetric enzymatic method. Low density lipoprotein cholesterol (LDL) was calculated from the Friedewald's equation. Atherogenic index of plasma (AIP) was calculated as Log (TG/HDL), and TC/HDL ratio also calculated. Body mass index (BMI) was calculated by taking measurements of weight and height in meter^2. Systolic, diastolic blood pressure and pulse values were determined from the subjects using sphygmomanometer. The results depict a significantly lower SBP (mm/Hg) values for pensioners as compared to Applicants, Civil servants and Traders ($p<0.0001$). Likewise a significantly lower W/H ratio values for Applicants as compared to Civil servants, Pensioners and Traders ($p<0.0001$). Furthermore, the results reveal no significant differences in DBP ($P=0.1603$), PULSE ($P=0.5967$) and BMI ($P=0.2748$) mean values of the subjects in relation to occupation. There were significant differences in Lp-PLA2 ($p=0.0114$), TC-HDL ratio ($p=0.004$), Gen cardiovascular risk % based on BMI and HDL/TC ratio ($p=0.0013$ & $p=0.0128$) respectively for the various occupations. Impliedly different occupations may favour different risk factors, hence the imperativeness of multiple risk assessment.*

Keyword: *Cardiovascular risk, C-reactive protein, Lipoprotein phospholipase A_2, Occupation.*

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I. Introduction

Cardiovascular diseases (CVD) are multifactorial and many causative factors are likely to have a long latency between exposure and the development of clinically significant cardiovascular diseases. Impliedly the disease usually develops slowly, over many years, making the connection between exposure and disease difficult to identify. The risk of CVD may decrease fairly quickly once exposure ceases [1], although the extent and rate of this decrease is not certain, and it may be that the increased risk persists for many years [2]. Adjustment for multiple covariates revealed an independent association between occupational status and most CVD risk factors, with physical activity attenuating this association [3]. However limited evidence was found to support a positive relationship between occupational sitting and health risks [4].

Many workers will have one or more of these risk factors in addition to other risk factors associated with their occupation. In addition, some of these general risk factors may be directly related to their occupation. In addition to genetic and lifestyle factors, work-related influences are linked to a higher risk for diseases [5]. Cardiovascular diseases do not necessarily develop with a risk factor, but the more risk factors present, the greater the likelihood they will, unless care/action is taken to modify such risk factors and a large percentage of CVDs is preventable through the reduction of behavioural risk factors: tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol [6]. The traditional risk factors and assessment methods do not capture or explain all of the risks inherent in CVD, as cardiovascular events still occur in persons with normal lipid levels, as the casual association to their job type is often overlooked. Hence this study brought to focus the relationship between cardiovascular risk markers and occupation in apparently healthy subjects.

II. Materials And Methods

2.1 Subject Characterization and Selection

A total of 167 apparently healthy adult male and female within the age of 30 to 59 years subjects involved in various job activities were recruited for this study. The occupational categories comprised of Civil servants, Applicants, pensioners and Traders. Informed consent was obtained from all subjects and a structured

questionnaire was used to collect demographic data as well as consideration to their occupational status, smoking profile, alcoholic status and physical activities.

Measurements of weight and height were made as to ascertain the body mass index (BMI) of the subjects, also waist and hip measurements were taken**.** Blood Pressure and Pulse rate were measured in two fold after 5minutes rest using OMRON-M7brand digital sphygmomanometer**.**

Persons with cardiovascular diseases, previous cardiovascular events and a history of cardiovascular events were excluded from the study. Also pregnant women and persons with diabetes mellitus, hypertension and kidney disease were exempted from this study.

2.2 Sample collection and analysis

Proper venipuncture technique was employed in the collection of 5ml of blood from the subjects with a sterile vacutainer needle into a Lithium heparin vacutainer tubes. Samples were centrifuged for 5 minutes at 3000 RPM. The plasma samples were separated into plain tubes and stored frozen at -20°C until the time of determination of CRP, Lp-PLA_2 and lipid profile.

2.3 Statistical Analysis

Data generated were analyzed using Graph Prism Pad (version6.2) and National Council for Social Science (version 13). Results were presented as mean ± standard deviation and inferences were deduced using Independent t-test, Anova, Tukey's multiple comparison, Correlation coefficient, and post test probabilities. Results were considered statistically significant at 95% confidence interval ($p<0.05$).

III. Results

3.1 Effect of Occupation on the Biophysical and Anthropometric Parameters of the Study Population

The outcomes of the ANOVA on the effects of occupation on the biophysical and anthropometric parameters of the subjects are shown in Table1. It depicts a significantly lower SBP (mm/Hg) values for pensioners as compared to Applicants, Civil servants and Traders ($p<0.05$). Likewise a significantly lower W/H ratio values for Applicants as compared to Civil servants, Pensioners and Traders ($p<0.05$). Furthermore, the results reveal no significant differences in DBP (P=0.1603), PULSE (P=0.5967) and BMI (P=0.2748) mean values of the subjects in relation to occupation.

Table 1 Effect of Occupation on the Biophysical and Anthropometric Parameters of the Study Population

Occupation	SBP(mm/Hg)	DBP(mm/Hg)	PULSE(bpm)	W/H RATIO	BMI(Kg/m^2)
Applicants N=32	117.09 ± 9.67	74.78 ± 9.08	76.96 ± 12.7	0.84 ± 0.07	26.63 ± 6.41
Civil servants N=76	121.65 ± 12.32	74.64 ± 10.7	76.97 ± 10.27	0.86 ± 0.06	26.91 ± 4.84
pensioners N= 8	104.75 ± 14.65	68.5 ± 8.02	71.5±9.18	0.89 ± 0.02	24.45 ± 3.62
traders N=51	125.22 ±12.61	77.25 ± 12.01	76.76 ± 10.76	0.93 ± 0.05	27.83 ± 3.77
p-Values	< 0.0001	0.1603	0.5967	<0.0001	0.2748
F-values	8.152	1.74	0.6299	10.74	1.304
	ss	ns	ns	ss	ns
Tukey's Multiple Comparison Test		Summary	Summary	Summary	Summary
Applicants vs Civil servant	ns	ns	ns	ns	ns
Applicants vs Pensioner	ns	ns	ns	ns	ns
Applicants vs Traders	*	ns	ns	***	ns
Civil servant vs Pensioner	**	ns	ns	ns	ns
Civil servant vs Traders	ns	ns	ns	***	ns
Pensioner vs Traders	***	ns	ns	ns	ns

3.2 Effect of Occupation on the Lipid Parameters of the Study Population

Comparisons of the effects of occupation on lipid parameters of the subjects are shown in Table 2. It shows significantly higher (p=0.003) TG levels in Civil Servants, compared to Applicants, Pensioners and Traders. There were no significant differences in TC (p=0.2025), HDL (p=0.5709), LDL (p=0.5609), and TC/HDL ratio (p=0.5028) in relation to occupation.

Table 2 Effect of Occupation on the Lipid Parameters of the Study Population

Occupation	TG (mmol/L)	TC (mmol/L)	HDL(mmol/L)	LDL (mmol/L)	TC/HDL RATIO
Applicants N=32	1.65±0.7	5.68±1.46	1.24 ± 0.46	3.83 ± 1.62	5.06 ± 1.95
Civil servants N=76	1.74±0.88	5.58±1.23	1.34 ± 0.59	3.60 ± 1.37	4.88 ± 2.11
pensioners N= 8	1.42±0.54	5.73±0.91	1.51 ± 0.23	3.17 ± 0.65	3.87 ± 0.68
traders N=51	1.25±0.51	5.16±1.41	1.28 ± 0.51	3.41 ±	4.68 ± 2.22

				1.77	
p-Values	0.03	0.2025	0.5709	0.5609	0.5028
F-values	4.828	1.554	0.6912	0.6876	0.787
Tukey's Multiple Comparison Test	Summary	Summary	Summary	Summary	Summary
Applicants vs Civil servants	ss	ns	ns	ns	ns
Applicants vs Pensioners	*	ns	ns	ns	ns
Applicants vs Traders	*	ns	ns	ns	ns
Civil servant vs Pensioners	*	ns	ns	ns	ns
Civil servants vs Traders	**	ns	ns	ns	ns
Pensioners vs Traders	ns	ns	ns	ns	ns

3. 3 Effect of Occupation on the Cardiovascular Risk Markers of the Subjects

The effects of occupation on cardiovascular risk markers of the subjects are shown in Table 3. There were significant differences (p=0.0114) in Lp-PLA_2 and TC/HDL ratio (p=0.0041) with applicants having the highest value of 194.22±7.02 and 3.49±1.84 respectively. Again a significantly higher (p=0.0013; p=0.0178) General cardiovascular risk % based on BMI and General cardiovascular risk %based on HDL/TC ratio respectively was observed in pensioners as compared to traders, civil servants and applicants. The results also show no significant difference (p=0.584) in CRP in the subjects with respect to occupation.

Table 3 Effect of Occupation on the Cardiovascular Risk Markers of the Subjects

Occupation	**C-RP (ng/ml)**	**Lp-PLA_2(ng/ml)**	**TC/HDL RATIO**	**AIP**	**Gencardio BMI(%)**	**Gencardio HDL/TC(%)**
Applicants N=32	16.12 ± 7.02	194.22 ± 87.89	3.49 ± 1.84	0.02 ± 0.01	1.59 ± 0.85	1.89 ± 0.81
Civil servants N=76	14.80 ± 4.97	148.06 ± 64.38	2.37 ± 1.24	0.11 ± 0.001	2.72 ± 2.09	3.16 ± 2.29
pensioneers N= 8	16.15 ± 3.22	243.50 ± 147.23	2.47 ± 0.99	0.04 ± 0.20	4.35 ± 4.99	4.4 ± 5.09
traders N=51	14.59 ± 5.82	186.91 ± 133.22	3.20 ± 2.09	0.01 ± 0.21	3.12 ± 1.82	3.52 ± 3.14
p-Values	0.584	0.0114	0.0041	0.0182	0.0013	0.0178
F-values	0.65	3.8	5.485	3.441	5.498	3.456
Summary	ns	ss	ss	ss	ss	ss
Tukey's Multiple Comparison Test	Summary	Summary	Summary	Summary	Summary	Summary
Applicants vs Civil servant	Ns	ns	**	ns	*	ns
Applicants vs Pensioner	Ns	ns	ns	ns	**	ns
Applicants vs Traders	Ns	ns	ns	ns	**	*
Civil servant vs Pensioner	Ns	*	ns	ns	ns	ns
Civil servant vs Traders	Ns	ns	*	*	ns	ns
Pensioner vs Traders	Ns	ns	ns	ns	ns	ns

IV. Discussion

On the effect of occupation on the biophysical parameters, there was no significant difference in the BMI, Pulse and diastolic blood pressure (DBP) of the subjects in relation to occupation. However, significantly higher systolic blood pressure (SBP) was found in the traders compared to civil servants and pensioners, but the levels were within normal range. The elevated SBP in the traders could be as a result of the nature of their job that makes them move from one place to the other as compared to pensioners and civil servants who are mostly settled at the office. Our finding agrees with that of [7] and the reports of the World Health Organization (WHO) which places occupation as one of the risk factors for increased blood pressure [8].

Also, occupation had no significant effect on the lipid parameters (TC, HDL, LDL & TC/HDL ratio) of the subjects in our study. However, Triglyceride (TG) levels were significantly higher in civil servants compared to pensioners and traders. Several studies have related job/occupational stress to lipid disorders and dyslipidaemia using professional divers and people of diverse occupations as subjects [9,10]. Occupation had a significant difference on the cardiovascular risk markers (Lp-PLA_2, AIP, Gen cardio risk based on BMI and lipids) of the subjects except for CRP that showed no significant differences in relation to occupation. A study by [11] confirmed that occupation and other variables impacted on cardiovascular markers especially atherogenic index of plasma (AIP) and the risk of CVD.

V. Conclusion

Systolic blood pressure was significantly elevated in traders compared to civil servants and pensioners. While triglyceride was significantly higher in civil servants than traders and pensioners. There was significant difference in the Lp-PLA2, AIP, Gen cardio risk based on BMI and triglycerides of the subjects in relation to various occupations. Various occupations may favour different risk factor or index, hence the imperativeness of application of multiple cardiovascular risk assessor. It is import to note that this study did not consider the duration of occupation as a factor.

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