INFLUENCE OF ROUTINE PHYSICAL ACTIVITY ON RESTING PULSE RATE OF ACADEMIC STAFF IN TERTIARY INSTITUTIONS IN KATSINA STATE, NIGERIA

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Abstract

This research was conducted to determine out the influence of routine physical activity on body composition of academic staff in tertiary institutions in Katsina State. Nigeria. For the purpose of this study the ex-post-facto research design was used. The population was all male academic staff in tertiary institutions in Katsina State, purposive, proportionate and random sampling procedures were used to select 176 male academic staff to participate in the study. Hand-held Bioelectrical impedance analyser was used to determine body mass index. Routine physical activity questionnaire was used to determine routine physical activity of the participants of this study. The data collected were statistically analysed using regression analysis with significant level at P=0.05. The result of the study revealed that routine physical activity had significant influence on resting pulse rate (F = 0.675, P=0.010), It was recommended that opportunities to influence academic staff participation in routine physical activities should be readily available at tertiary institutions. Academic staff should be encourage to participate in routine physical activities to improve their body composition and cardiovascular variables in order to achieve the best of health status. Sedentary individuals should be encouraged to begin with low-intensity physical activity and PA should be practised at a moderate intensity level in everyday life.

Keywords: Routine physical activity, Resting pulse rate, Academic staff, Tertiary institutions and Katsina State

Introduction

Routine physical activity (RPA) is defined as regular and habitual activity performed to improve health and maintain one or more components of physical fitness done on daily basis. The major contributors are everyday activities that involve moving the body around, such as walking, cycling, climbing stairs, housework, and going for shopping, workplace, sports and recreational activities with much of it occurring as incidental part of our routine physical activity. RPA may include activities performed around the home, during leisure time and at workplace (Fariasa, Gonçalves, Morcillo, Guerra-Junior, & Amancio, 2015). Physical activity (PA) is any bodily movement produced by contraction of skeletal muscles that results in energy expenditure beyond resting level. This is a broad definition of PA which involves virtually all types of activities like walking, cycling, dancing, games, gardening, household work, sports and other recreational activities **(**WHO, 2012; Odunaiya & Oguntibeju, 2013**).** Conversely, an individual is termed inactive when there is no marked increase in energy expenditure above resting level. Sedentary life-style include some activities that are usually not enough for gaining health effects, while active life-style is a way of life that integrates at least half an hour of low to moderate physical activity each day into daily routines (Piirtola, Kaprio, Waller, Heikkila, Koskenvuo & Svedberg, 2016).

Physical activity can be categorized as those that involve structured and repetitive bodily movements, and those activities of daily living such as standing, commuting to and from school or work, or participating in household chores or occupational work. Thus, sport is seen as particular types of physical activities, which usually involve some form of competition and usually being taken to improve fitness and health. Thus, the levels and patterns of physical activities in a population determine important generic indicators in public health (Venkateswarlu, 2010; Hallal, Anderson, & Bull, 2012; Odunaiya & Oguntibeju, 2013). The term health-enhancing physical activity is defined as any form of physical activity that benefits health and functional capacity without undue harm or risk to the person doing it. It emphasizes the connection between health and physical activity (Adegboyega, & Olanipekun, 2010; Odunaiya & Oguntibeju, 2013). Physical inactivity, usually together with unhealthy dietary habits are associated with the development of many of the major non communicable diseases and ill-health conditions in the society such as high blood pressure, stroke, type 2 diabetes mellitus, some forms of cancer, obesity and osteoporosis (Odunaiya, Ayodele & Oguntibeju, 2010; Odunaiya & Oguntibeju, 2013; Heyward, 2014).

Routine physical activity (RPA) is recognized as a key determinant of health and wellness. Research evidence indicates that low levels of physical activity are linked with morbidity and mortality in adults, particularly the risk of chronic diseases such as type 2 diabetes, heart disease, osteoporosis and certain types of cancer and the risk of overweight and obesity (World Health Organisation (WHO) 2010; Darren, & Shannon, 2015; Sara, David, Ali & Lauretta, 2015). RPA has been shown to improve body composition by reducing abdominal adiposity and improved weight control (Elisa, Joana, Andreia, Flavia & Jorge, 2011;Petri, 2016); enhance lipid lipoprotein profiles by reducing triglyceride levels, increased high density lipoprotein cholesterol (HDL-C] levels and decrease low-density lipoprotein cholesterol (LDL-C) to high-density lipoprotein (HDL) ratios (St-Onge & Gallagher, 2010; .Darren *et al*., 2015), improve glucose homeostasis and insulin sensitivity (Francis & Elijah, 2017) reduce blood pressure, improve autonomic tone(American College of Sports Medicine, 2009) reduce systemic inflammation; decrease blood coagulation, improve coronary blood flow, augment cardiac function and enhance endothelial function (American College of Sports Medicine (ACSM), 2009, 2011; Kravitz, & Heyward, 2017). Chronic inflammation as indicated by elevated circulating levels of inflammatory mediators such as C-reactive protein has been shown to be strongly associated with most of the chronic diseases whose prevention has benefited from exercise. Researchers have shown that exercise training may cause marked reductions in C-reactive protein levels (Narayani & Sudhan Paul Raj, 2010). Each of these factors may explain directly or indirectly the reduced incidence of chronic disease and premature death among people who engage in routine physical activity (Narayani *et al.*, 2015).

Resting heart rate (RHR) is one of the simplest and most important cardiovascular parameters asses during RPA (Quinn, 2014). Measuring it involves simply taking the subjects pulse, usually at radial or carotid veins. The RHR refers to the ventricular rate of beating per minutes. It can be determined by counting either the arterial pulse, the heart sound (using stethoscope) or number of cycles in an ECG record/minutes (American Heart Association (AHA), 2014). Normally, it averages 75 beats/minutes in young adults' male during rest. It is basically determined by the strength of the vagal tone, and is normal subjected to many physiological variations (Kenney, Wilmore & Costill, 2012). The strong relationship between RPA, health and wellness is not in doubt because RPA has many health and fitness benefits well documented. These benefits are enjoyed due to regular participation in an exercise programme. At the time when exercise scientists demonstrated the association between longevity and exercise, researches (Venkateswarlu, 2010; Kenney, Wilmore & Costill, 2012; & Heyward, 2014) in the field of cardiology began to understand that RPA reduces cardiovascular risk by reducing blood pressure. The essence of exercise may dictate the mode (type), frequency, duration and in of the exercise prescription. The concern about the proper dose of exercise prescription that will bring about a desired effect (response) is similar to the physician's need to know the type and quantity of a drug as well as the time frame over which it must be taken to cause the desired health effects (Powers & Howley, 2012). It is a common fact that the dose of RPA improves the health-related outcomes, such as lower mean arterial blood pressure (MABP), resting heart rate (RHR), and percent body fat. Research evidences from (Venkateswarlu, 2011; Powers & Wilmore, 2012; Heyward, 2014) have shown that RPA positively influences cardiovascular variables that include MABP, RHR, BP, and %BF.

Recent research studies clearly demonstrated strong evidence that regular participation in routine physical activity enhances fitness benefits as well as cardiovascular function among adults, such as heart and muscular functions, build and maintain healthy bones, enhance blood circulation and metabolic rate, and favourably influence body composition (Gibala, Little, MacDonald & Hawley, 2012; Heyward, 2014; Gladmohesh & Sundaramurthy, 2015).
Physical inactivity, usually together with unhealthy food habits is associated with the development of many of the major non-communicable diseases and conditions in the society, such as cardiovascular disease, some cancers, obesity, diabetes, osteoporosis. It has become increasingly clear that physical inactivity is a global health issues among young and old (Odunaiya, Ayodele & Oguntibeju, 2010; Halal, Anderson, Bull *et al*, 2011; Odunaiya & Oguntibeju, 2013), this is because progressively inactive as they spend more time indoor with place of work, assignment, computer games, television and going to work place by bus or personal car (Odunaiya *et al*., 2013). According to World Health Organisation (2010), inactivity is responsible for a multitude of diseases, disabilities and even death. A dose-response relationship has been observed between times spent in sedentary behaviours (for example, T.V. viewing time, sitting in a car, overall sitting time and all-cause and cardiovascular disease mortality (Katzmarzyk & Craig, 2009; Odunaiya *et al*., 2010; Warrenet Barry, Hooker, Sui, Church, & Blair, 2010; Odunaiya, 2013). This growing epidemiological evidence links with sedentary behaviour to health to health outcomes, including anxiety, diabetes mellitus, colon cancer, osteoporosis, high blood pressure, deep vein thrombosis, obesity, kidney stone, depression and cardiovascular diseases. This has been shown in the epidemiological reviews of physical inactivity, and it was concluded that sitting for a very long time in some particular jobs, using elevator, sitting in a car, T V viewing time and other encompassing factor is associated with some sedentary behaviours (Pate, O'Neil and Lobelo, 2008; Odunaiya *et al*., 2013. From the findings reported in the literature above and coupled with

the observed consequences of inactivity among adults, this investigation is proposed to find the influence of routine physical activity on body composition and cardiovascular variables of academic staff of tertiary institutions in Katsina State.

Research Question

This study was proposed to answer the following specific research question.

Would involvement in daily routine physical activity influence resting pulse rate of male academic staff of tertiary institution in Katsina State?

Hypothesis

The following hypothesis will be tested for the purpose of this study.

Routine physical activity has no significant influence on resting pulse rate of male academic staff in tertiary institutions in Katsina State.

Methodology

The ex-post-facto research design was used for this study. This type of research design examines the cause and effect through selection and observation of existing variables without any manipulation of the existing conditions (Akinade & Owolobi, 2009). The population of this study consisted of all male academic staff of tertiary institutions in Katsina State. There are eight hundred and seventy eight (878) male academic staff in tertiary institutions of Katsina State. In this study, purposive, proportionate and random sampling procedures were used. The non-awarding degree institutions excluding paramedical institutions in Katsina State were purposively selected; they are Isa Kaita College of Education, Dutsin-ma, Hassan Usman Polytechnic, Katsina, Federal College of Education, Katsina, and Yusuf Bala Usman College of Legal and General Studies, Daura. Only male academic staff were purposively selected for this study. Proportionate sampling technique was used to assign number of questionnaires to be administered in each of the institutions selected and random sampling techniques was used to select respondents. One hundred and seventy six (176) male academic staff were drawn from the above named institutions. This agrees with Best & Kahn (1986) and Nworgu (2015) that in a research of lower population of 878, twenty percent (20%) of the total number of male academic staff per each stratum is recommended.

Table 1: Distribution of Samples

S/No.	**Name of Institution**	Population	Sample
1	Isa Kaita College of Education, Dutsin-ma	240	48
2	Federal College of Education, Katsina	300	60
3	Hassan Usman Polytechnic, Katsina	269	54
4	Yusuf Bala Usman College of Legal and General Studies, Daura	69	14
	TOTAL	**878**	**176**

Source: Registry Department of the respective Institutions as at 2017

The following instruments were used for data collection in this study.

i. Sphygmomanometer K-112 Aneroid type and Dual Head stethoscope Model No. S- 223, manufactured in India to measure BP and resting heart rate.

ii. Routine Physical Activity Questionnaire.

Although there are several methods that can be used to measure blood pressure, the auscultatory method was used for this research. The method which requires the use of a stethoscope and sphygmomanometer has a dual advantage of being simple and is commonly used in many health–related fields. Instruments to be used for this measurement are the KA – 112 Aneroid Sphygmomanometer and Dual Head Stethoscope Model S – 223 manufactured by Medicare Instruments WUXD (LTD). No. 301 Xixin Road, Zhanging China. Subjects were made to rest by lying down on couches for 15-30 minutes on arrival. This was done to calm down nerves of the sternum (5^{th} intercostal space), (Guyton, 1991), the two heart sounds were heard for 60 seconds and recorded as pulse rate per minutes. Routine physical activity questionnaire for adults was adapted to be administered simultaneously with the measurement of cardiovascular variables of each participant. The questionnaire comprised demographic data of the respondents and two sections on work activity and leisure activity. All the items on work activity were not changed while some items on leisure activity were added to the questionnaire. The questionnaire tested the routine physical activity participation of the participants. The total points obtained by each respondent for all responses were used as

routine physical activity scores. It was also scored as outlined on the original questionnaire as developed and scored by Baecke *et al*, (1982) as follows:

Never = 1, seldom = 2, sometimes = 3, often =4 and always =5. See Appendix A and B.

Descriptive statistics of frequency counts, mean, standard deviation, and standard errors of means were used to describe the demographic data and responses obtained on the routine physical activity questionnaire. The inferential statistics of multiple regression analysis was used to assess the influence of routine physical activity on the variables. The formulated hypothesis was tested at 0.05 level of significance. Data collected for this study were analysed using the Statistical Package for Social Science (SPSS) version 22.0 for windows (SPSS Inc., Chicago, Illinois, USA).

Results

One hundred and seventy six (176) copies of the questionnaire were administered to the respondents and one hundred and seventy five (175) were recieved, upon which the data were analysed.

Table 2: Physical Characteristics, Body Mass Index (BMI) of the Respondents (n=175)

Variable	N	Mean	SD	S.E.
Height (cm)		171.17	6.86	.52
Weight (kg)		70.17	17.34	1.31
Resting Heart Rate (bpm)		83.51	11.94	.90

Table 2 shows the mean and standard deviation of the physical characteristics, body composition and cardiovascular variables of the respondents used in this study. The mean and standard deviation of height and weight of the respondents were 171.17±6.69 cm and 70.17±17.34 kg respectively. Resting heart rate had mean and standard deviation of 83.51±11.94 bpm. The rating for health of the variable indicated was above normal for the participants.

Hypothesis: There is no significant influence of routine physical activity on resting pulse rate of male academic staff of tertiary institutions in Katsina State.

Table 3: Multiple Regression Analysis on Routine Physical Activity and Resting Pulse Rate

Model Summary[b]

	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.745[a]	.555	.729	12.12334	1.745

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1478.888	15	98.593	0.675	.010[b]
	Residual	23222.106	159	146.051		
	Total	24700.994	174			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Routine physical activity	90.305	9.391	-.018	9.616	.010

The Table 3 above shows the regression analysis of the influence of routine physical activity on resting pulse rate of male academic staff of tertiary institutions in Katsina State. The result recorded a coefficient of R^2 value of 0.729 implies that the 72.9% of variation in the resting pulse rate were explained by the routine physical activity. The remaining 27.1% can be attributed to error in specification and the exclusion of other factors from the model. The result also indicated that strong correlation coefficient of 0.745 existed between routine physical activity on resting pulse rate. R squared showed that there is 0.555 proportion of variance. The *t*-value of 9.616 is greater than the *t*-critical 1.97. F-calculated value of 3.671 is greater than the F-critical of 2.68. The P-value of 0.010 is less than 0.05 level of significance. Therefore, the null hypothesis which states that there is no significant influence of routine physical activity on resting pulse rate of male academic staff of tertiary institutions in Katsina State, is hereby rejected.

Discussion

The findings of this study revealed that routine physical activity had influence on resting heart rate on male academic staff of tertiary institutions in Katsina State, Nigeria. This result agreed with the finding of Paul (2016) who found that both total exercise amount and aerobic exercise amount were significantly related to resting heart rate, total exercise amount was a better overall predictor of resting heart rate than was aerobic exercise amount. All forms of exercise were associated with cardiovascular health, with cardiovascular benefits accruing according to the amount of exercise performed, even in optimally healthy young adults. Similarly, Sheehan (2010), observed that, though RPA has a long-term effect on BP and pulse, these beneficial effects require a continued exercise programme, and that the benefit last only as long as individual continue to exercise.

Conclusion

Based on the findings of this study, the following conclusion was made;
Routine physical activity significantly influence resting pulse rate

Recommendations

On the basis of the findings of this study, the following recommendations were made:

1. Individuals no matter the status should be involved in physical activities and recreation which should be and last for at least 30 minutes three (30 days a week.
2. Sedentary individuals should be encouraged to begin with low-intensity physical activity.
3. PA should be practised at a moderate intensity level on everyday life

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