The Practice of Physical Exercise among the Staff of the International Institute of Tropical Agriculture, Ibadan, Nigeria.

S.A. Adeleke[1] , E.A. Abioye-Kuteyi[2], O.O. Sikuade[1]

[1]Medical unit, International Institute of Tropical Agriculture, P.M.B 5320, Ibadan, Oyo State

[2]Department of Community Health, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.

KEYWORDS

**Practice,
Exercise,
Leisure,
Work-
related,
Overweight,
Obesity.**

ABSTRACT

Background: Physical exercise is important for good health. Moderate physical exercise for at least 30 minutes, five times a week is the minimum recommendation for adults. The objective of the study was to assess the level of physical exercise among the staff of an International research Institute in Ibadan, Nigeria.

Methodology: This was a descriptive cross sectional study of 206 employees sampled proportional to the size of the IITA staff categories. After obtaining informed consent data on socio-demographic parameters, anthropometric measurements, knowledge of obesity, the practice of leisure and work-related exercise were obtained using a structured questionnaire. The data were analyzed using the Statistical Analysis System (SAS) version 9.2.

Results: The mean age of the respondents was 37.0 ± 10.8 years. Practice of leisure exercise was adequate, inadequate and nil in 16%, 54% and 30% respectively. The leisure exercises practiced most commonly were brisk walking, jogging and swimming in 42.2%, 20%, and 8.4% respectively. The survey revealed that 72%, 9% and 19% of the respondents were significantly active, moderately active and sedentary at work respectively. The majority, 61.5%, of the management staff were involved with sedentary jobs. The respondents with low formal education were more active at work compared to those with higher education, $p = 0.005$. Overall, 88.2% were physically active although about 45% of respondents were either overweight or obese and less than half had good knowledge of obesity.

Conclusion: Public education is needed to improve physical activity and curb the menace of health problems associated with sedentary lifestyle.

Correspondence to
Samson Adegoke Adeleke
Family Physician,
Medical unit, International Institute of Tropical Agriculture,
P.M.B 5320, Ibadan, Oyo State, Nigeria.
Email: sam_fola@yahoo.com, Phone number: 234-8033-788-470

INTRODUCTION

Regular physical exercise is important for the health of people of all ages[1]. It protects from heart disease, stroke, high blood pressure, non-insulin dependent diabetes, obesity, back pain, osteoporosis in addition to improving mood and helping to manage stress[2]. Sedentary lifestyle is associated with obesity, hypertension, stroke and cardiovascular diseases[2]. In a study in Northern Nigeria, educational level was the only factor that correlated with regular exercise and knowledge of exercise[3]. The minimum recommended level of physical activity that offers health benefits in an adult is 30 minutes of moderate physical activity a day at least five times a week[5]. Greater health benefits can be experienced with

physical activity of longer duration or greater intensity[5, 6]. It does not matter what type of physical activity is performed, the key factor is the total energy expenditure[5, 6]. To accurately characterize overall physical activity, activity derived from a variety of sources, including transportation and work-related activity, should be assessed and not just leisure exercise (outside the routine work-related activity) such as brisk walking, swimming and other sporting activities[7]. Leisure physical exercise is good for every individual but particularly for individuals whose routine does not involve significant physical activity at work. Interventions to promote leisure-time physical activity need to be given more priority in health care with adequate attention given to public health safety during physical exercise[8, 9]. Identified barriers to leisure physical exercise include lack of time, motivation, money, an enabling environment, ill-health and old age[10, 11]. In spite of several enlightenment programs on the need for regular physical activity, no specific study on the practice of physical exercise has been conducted in the study location. This study was thus undertaken to assess the practice of physical exercise by the staff in an international research institute in western Nigeria. The staff members of the institute are of different cadre and are from almost all the regions in Nigeria. The institute also has few expatriates from other countries of the world. All staff members had access to several recreational facilities such as a football, volley ball and basket-ball fields, swimming pool, tennis court, golf course and suitable environment for walking, cycling and jogging.

METHODOLOGY

This was a descriptive cross-sectional study of the employees of the International Institute of Tropical Agriculture (IITA) located in Ibadan, Nigeria. The study was carried out from March to September 2011. The International Institute of Tropical Agriculture is a donor driven multinational agricultural institute involved primarily in research for development that is aimed at ensuring food security and the eradication of hunger in Africa. The headquarter at Ibadan has approximately 605 workers of different cadre mainly from Nigeria and

few expatriates from other countries of the world. This study location has several recreational facilities such as a football, volley ball and basket-ball fields, swimming pool, tennis court, golf course and suitable environment for walking, cycling and jogging. The employees were stratified by staff category. Two hundred and six (206) employees were selected randomly proportional to staff categories among junior, senior and management staff for the study to ensure proportionate representation for each staff category. The sample size of 206 was determined using the formula for populations less than 10,000[12] (the total staff population for the Institute was 605 at the time of this study). Pregnant women, ill workers and those hospitalized within two months of the survey were excluded from the study.

Study instruments

A pre-tested structured questionnaire designed for the purpose was used to obtain socio-demographic data, anthropometric measurements, knowledge of obesity, level of work-related physical activity and the practice of leisure exercise, including daily duration and weekly frequency. The weight was measured and recorded in kilogram to the nearest 0.5kg with the respondent in light clothing using the the Seca model weighing scale. The height was measured in centimetres to the nearest 0.1 centimeter using a self-retaining AW tape measure fixed to the wall. The body mass index was computed for each respondent from the formula: Weight (kg)/ {Height (M)} ^2. Body mass index of 19-24.9Kg/m^2, 25-29.9Kg/m^2 and at least 30Kg/m^2 was regarded as normal, overweight and obesity respectively.

Responses to relevant questions on the knowledge of obesity were scored as follows: Correct responses to the questions were scored one point each. Wrong or no responses were scored zero. Aggregate knowledge score was determined for each respondent. Percentage scores of =33%, 34-66% and =67% were rated as poor, average and good knowledge of obesity respectively in line with Smith et al classification[13].

Two forms of physical exercise were assessed

independently and later combined to determine the overall level of physical activity. Work-related physical activity was classified as follows: Sitting to perform work tasks for the five working days in a week constituted the sedentary work group, work that involved less than 30 minutes of moderate physical activity (such as walking, field activities and body movements that make one to sweat) per day for the five working days or a total of less than 150 minutes in a week constituted moderate work-related physical activity group and work that involved physical activity (moderate to vigorous body movement that makes one to sweat) of up to 30 minutes daily for the five working days or at least 150 minutes altogether in the week constituted significant work-related physical activity[8,14].

Practice of leisure exercise of moderate intensity of at least 30 minutes daily duration and for at least 5 times or at least 150 minutes altogether per week was regarded as adequate leisure exercise. Leisure exercise that had daily duration of less than 30 minutes or weekly frequency of less than five times (less than 150 minutes altogether) was regarded as inadequate leisure exercise and the third category was the no leisure exercise group[8,9].

Overall physical activity was assessed as follows: Respondents with adequate leisure exercise and/or who were significantly active at work or a combination of any of the two above with moderate work-related physical activity or inadequate leisure exercise constituted the physically active group. The others constituted the inactive group who were at risk of sedentary-associated health problems.

The data were analyzed using the Statistical Analysis System (SAS version 9.2) software. Simple descriptive and inferential statistics were employed to illustrate findings and ascertain relationships and effects. The level of significance was set at $p < 0.05$.

Ethical clearance was obtained from the institute's committee on human experimentations.

RESULTS

Majority of the study respondents (74.2%) were of the Yoruba ethnic group (Table 1), five, 2.4%, were non-Nigerians. Table 1 shows that 3.4%, 29.1% and 67.5% of the respondents had primary, secondary and tertiary education respectively. The mean age of the respondents was 37.0±10.8 years. The management, senior and junior staff constituted 13.1%, 32.0% and 54.9% respectively. The mean body mass index was 25.0± 5.0Kg/m^2 (Table 1).

The prevalence of obesity among the subjects was 12.1%. More than one-half of the subjects (55.3%) had normal weight while 32.5% of them were overweight. Adequate leisure exercise was practiced by 15.5%, inadequate by 54.4% while 30.1% did not practice leisure exercise (Table 2). Figure 1 shows that the leisure exercises most frequently practiced included brisk walking (42.2%), jogging (20%) and swimming (8.4%). Figure 2 shows that while only 16% reported adequate leisure exercise, majority (72%) of respondents reported optimal or significant work-related physical activity. More than one-half (55.5%) of the subjects did not engaged in leisure exercise because of lack of time. Unconducive environment was the barrier among almost one-fourth (23.4%) of the subjects, 20.3% did not engage in leisure exercise because of lack of interest while 0.8% sited health reasons as the barrier. Table 2 shows that neither the knowledge of obesity nor respondents' socio-demographic characteristics and BMI were associated with the level of leisure exercise of respondents. In Table 3, a significant proportion of junior staff reported significant work-related exercise compared with the other staff categories $p < 0.05$. Majority, 61.5%, of the management staff were involved in sedentary jobs. The proportion of respondents with significant physically active jobs also decreased with increasing level of formal education (X^2 15.12; $p < 0.05$) as shown in Table 3.

The overall level of physical activity judging by the work-related and leisure exercise revealed that 88.2% of study subjects were physical active while 11.8% were inactive. Males were significantly more physically active than females as shown in Table 4 ($p < 0.05$). Overall physical activity was not associated with knowledge of obesity, BMI or any socio-demographic characteristic.

Table 1: SOCIO-DEMOGRAPHIC DISTRIBUTION OF THE RESPONDENTS

SOCIO-DEMOGRAPHIC FACTORS		Frequency n	Percentage (%)	Mean age	Standard deviation
Gender	Male	134	65.0	38.0	10.3
	Female	72	35.0	37.0	11.7
	Total	206	100	37.0	10.8
Staff Category	Junior	113	54.9	36.0	10.6
	Senior	66	32.0	37.0	10.3
	Management	27	13.1	44.0	10.4
	Total	206	100	37.0	10.8
Ethnicity	Yoruba	153	74.3		
	Igbo & Hausa	25	12.1		
	Others	28	13.6		
	Total	206	100		
Nationality	Nigerian	201	97.6		
	Others	5	2.4		
	Total	206	100		
Level of formal education	Primary	7	3.4		
	Secondary	60	29.1		
	Tertiary	139	67.5		
	Total	206	100		
Age groups	=25	39	18.9		
	26-35	51	24.8		
	36-45	63	30.6		
	=46	53	25.7		
	Total	206	100		

Table 2: Relationship between Leisure Exercise, socio-demographic factors, Work-Related Exercise, obesity knowledge and BMI of respondents

PARAMETERS		LEISURE PHYSICAL EXERCISE			
		Adequate	Inadequate	Nil	Total
		n (%)	n (%)	n (%)	n (%)
Staff Category	Junior	19 (17.0)	59 (52.0)	35 (31.0)	113 (54.9)
	Senior	10 (15.0)	33 (50.0)	23 (35.0)	66 (32.0)
	Management	3 (11.0)	20 (74.0)	4 (15.0)	27 (13.1)
	Total	32 (15.5)	112 (54.4)	62 (30.1)	206(100)
		$X^2 = 0.6$, df = 4, p = 0.76			
Gender	Male	25 (18.9)	79 (59.0)	30 (22.1)	134(65.0)
	Female	7 (9.7)	33 (45.8)	32 (44.5)	72 (35.0)
	Total	32(15.5)	112(54.4)	62(30.1)	206(100)
		$X^2 = 2.9$, df = 2, p = 0.09			
Level of Education	Below Tertiary	11 (16.4)	37 (55.2)	19 (28.4)	67 (32.5)
	Tertiary	21 (15.1)	75 54.0)	43 (30.9)	139 (67.5)
	Total	32(15.5)	112(54.4)	62(30.1)	206 (100%)
		$X^2 = 0.94$, df = 3, p = 0.63			
Age	=25	7 (18.9)	19 (51.4)	11 (29.7)	37 (18.1)
	26-35	3 (5.9)	35 (68.6)	13 (24.5)	51 (25.0)
	36-45	9 (14.3)	30 (47.6)	24 (38.1)	63 (30.9)
	=46	12 (22.6)	27 (50.9)	14 (26.5)	53 (26.0)
	Total	31(15.2)	111(54.4)	62(30.4)	204(100)
		$X^2 = 6.5$, df = 6, p = 0.09.			
BMI Classification	Normal	17 (14.9)	59 (51.8)	38 (33.3)	114 (55.3)
	Overweight	12 (17.9)	40 (59.7)	15 (22.4)	67 (32.5)
	Obese	3 (12.0)	13 (52.0)	9 (36.0)	25 (12.1)
	Total	32 (15.5)	112 (54.4)	62(30.1)	206(100)
		$X^2 = 3.0$, df = 4, p = 0.56			
Overall knowledge of obesity	Good	16 (12.0)	75 (56.4)	42 (31.6)	133 (64.6)
	Average	13 (22.8)	30 (52.6)	14 (24.6)	57 (27.7)
	Poor	3 (18.8)	7 (43.8)	6 (37.5)	16 (7.8)
	Total	32(15.5)	112 (54.4)	62 (30.1)	206(100)
		$X^2 = 1.0$, df = 4, p = 0.91			
Work-related exercise	Sedentary	6 (15.8)	22 (57.9)	10 (26.3)	38 (18.6)
	Moderate	2 (10.5)	11 (57.9)	6 (31.6)	19 (9.3)
	Significant	24 (16.3)	79 (53.7)	44 (30.0)	147 (72.1)
	Total	32 (15.7)	112 (54.9)	60 (29.4)	204(100)
		$X^2 = 0.66$, df = 4, p = 0.96			

Figure 1: Respondents' distribution by the forms of exercise practiced.
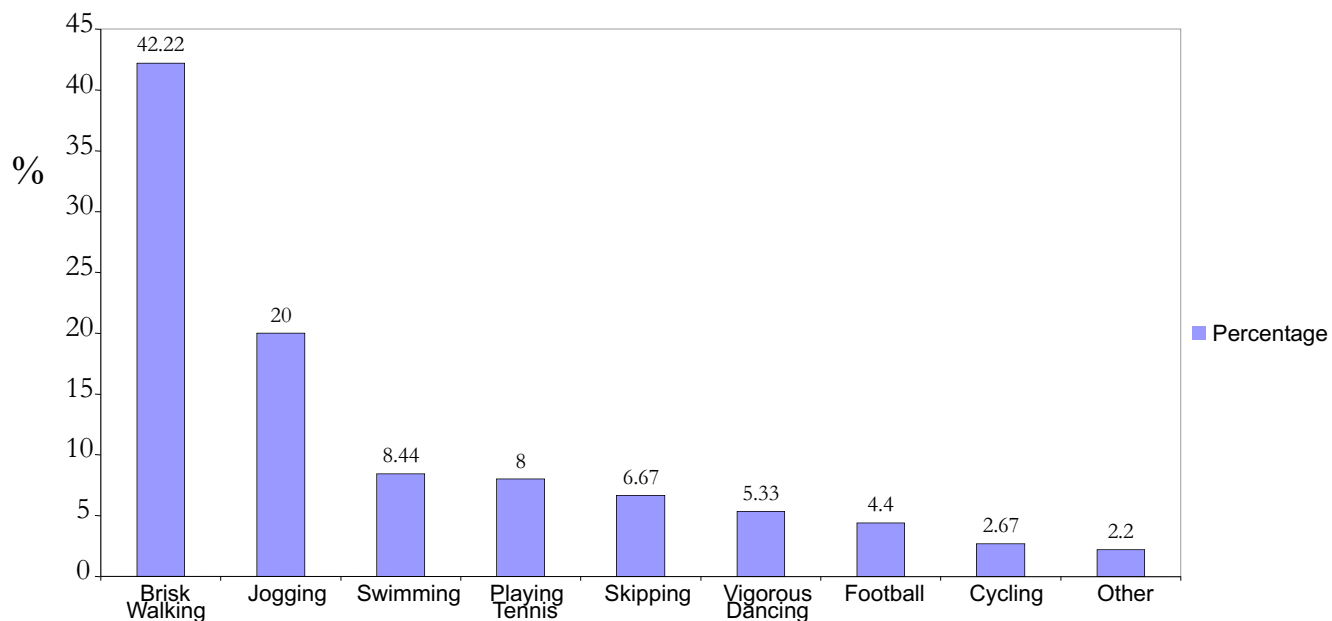

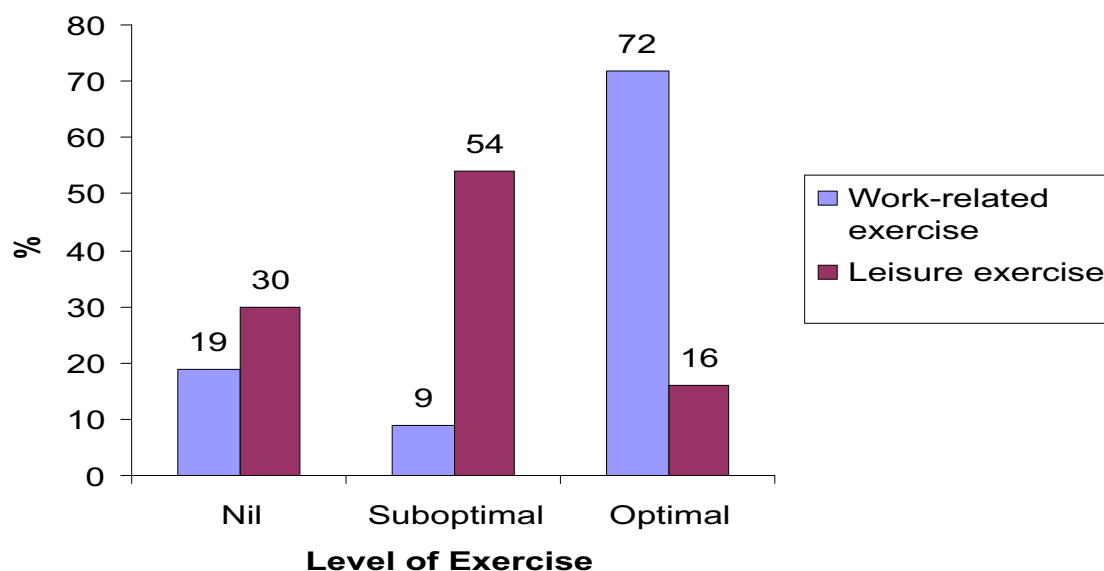**Figure 2: Respondents' distribution by work-related and leisure exercise**

Table 3: Relationship between Work-Related Exercise and (or Distribution of work-related exercise by) socio-demographic factors.

PARAMETER		WORK-RELATED EXERCISE			
		Sedentary	Moderate activity	Significant	Total
		n (%)	n (%)	n (%)	n (%)
Staff Category	Junior	7 (6.3)	9 (8.0)	96 (85.7)	112 (54.9)
	Senior	15 (22.7)	8 (12.1)	43 (65.2)	66 (32.4)
	Management	16 (61.5)	2 (7.7)	8 (30.8)	26 (12.7)
	Column Total	38 (18.6)	19 (9.3)	147 (72.1)	204 (100)
	X^2 = 45.8, df = 4, p = 0.0001*				
Gender	Male	24 (18.1)	8 (6.1)	101 (75.8)	133 (65.2)
	Female	14 (19.7)	11 (15.5)	46 (64.8)	71(34.8)
	Column Total	38 (18.6)	19 (9.3)	147 (72.1)	204 (100)
	X^2 = 5.0, df = 2, p = 0.08				
Level of Education	Below Tertiary	3 (4.5)	5 (7.5)	59 (88.0)	67 (32.8)
	Tertiary	35 (25.6)	14 (10.2)	88 (64.2)	137 (67.2)
	Total	38 (18.6)	19 (9.3)	147 (72.1)	204 (100)
	X^2 = 15.12, df = 3, p = 0.005*				
Age	=25	7 (18)	3 (7.7)	29 (74.3)	39 (19.1)
	26-35	4 (7.9)	3 (5.9)	44 (86.2)	51 (25.0)
	36-45	17 (27.4)	8 (12.9)	37 (59.7)	62 (30.4)
	=46	10 (19.2)	5 (9.6)	37 (71.2)	52 (25.5)
	Total	38 (18.6)	19 (9.6)	147 (72.1)	204 (100)
	X^2 = 10.18, df = 6, p = 0.12.				
Knowledge of obesity	Poor	1 (7.1)	1 (7.1)	12 (85.8)	14 (6.9)
	Average	11 (12.1)	12 (13.2)	68 (74.7)	91 (44.6)
	Good	26 (26.3)	6 (6.1)	67 (67.6)	99 (48.5)
	Total	38 (18.6)	19 (9.3)	147 (72.1)	204 (100)
	X^2 = 9.56, df = 4, p = 0.05				
BMI Classes	Normal BMI	22 (19.5)	12 (10.6)	79 (69.9)	113 (55.4)
	Overweight	4 (15.4)	3 (11.5)	19 (73.1)	26 (12.7)
	Obese	12 (18.5)	4 (6.2)	49 (75.3)	65 (31.9)
	Total	38 (18.6)	19 (19.3)	147 (72.1)	204 (100)
	X^2 = 1.4, df = 4, p = 0.8				

* Significant

Table 4: Relationship between overall Physical Activity socio-demographic factors, obesity knowledge and BMI of respondents

PARAMETER		Active	Inactive	Total
		n (%)	n (%)	n (%)
Staff Category	Junior	103 (92.0)	9 (8.0)	112 (54.9)
	Senior	55 (83.3)	11 (16.7)	66 (32.3)
	Management	22 (84.6)	4 (15.4)	24 (11.8)
	Total	180 (88.2)	24 (11.8)	204 (100)
		X^2 , df. 2, p 0.19.		
Gender	Male	122 (92.4%)	10 (7.6)	132 (64.7)
	Female	58 (80.6%)	14 (19.4)	72 (35.3)
	Total	180 (88.2)	24 (11.8)	204 (100)
		$X^2 = 6.3$, df = 1, p = 0.01*		
Level of Education	Below Tertiary	63 (94.0)	4 (6.0)	67 (32.8)
	Tertiary	117 (85.4)	20 (14.6)	137 (67.2)
	Total	180 (88.2)	24 (11.8)	204 (100)
		$X^2 = 3.8$, df = 1, p = 0.15.		
Age	=25	32 (82.0)	7 (18.0)	39 (19.1)
	26-35	50 (98.0)	1 (2.0)	51 (25.0)
	36-45	52 (83.9)	10 (16.1)	62 (30.4)
	=46	46 (88.5)	6 (11.5)	52 (25.5)
	Total	180 (88.2)	24 (11.8)	204 (100)
		$X^2 = 7.3$, df = 3, p 0.06.		
BMI Classification	Normal	96 (84.2)	18 (15.8)	114 (55.9)
	Overweight	62 (95.4)	3 (4.6)	65 (31.9)
	Obese	22 (88.0)	3 (12.0)	25 (12.2)
	Total	180 (88.2)	24 (11.8)	204 (100)
		$X^2 = 5.0$, df = 2, p = 0.08.		
Overall knowledge of obesity	Good	112 (86.8)	17 (13.2)	129 (63.2)
	Average	65 (91.5)	6 (8.5)	71 (34.8)
	Poor	3 (75.0)	1 (25.0)	4 (2.0)
	Total	180 (88.2)	24 (11.8)	204 (100)
		$X^2 = 1.7$, df = 2, p = 0.43		

*Significant

DISCUSSION

Most of the respondents (74.27%) were of the Yoruba ethnic group for the obvious reason that the study location is in the South Western part of Nigeria, which is populated by this ethnic group. The relatively high level of formal education is likely due to the fact that the research institute engages skilled professionals. Under-employment in the country could have resulted in highly educated individuals taking up low cadre jobs as only 45% of the respondents were either senior or management staff and as many as 68% of the study population had tertiary education (Table 1), thus implying that some staff with tertiary education were actually junior staff.

Only 16% engaged in adequate leisure physical exercise, 54% engaged in inadequate leisure exercise while 30% did not engage in exercise at all. The body mass index and knowledge of obesity did not have any significant impact on the reported level of leisure physical exercise, p > 0.05. Diajpratham and Chad however found that higher level of education correlated positively to the practice of leisure exercise[6]. It however suffices to note that the knowledge of obesity did not necessarily translate to the practice of adequate leisure physical exercise in the study group.

Among the 144 subjects who reported leisure exercise, the most frequently practiced form was brisk walking as shown in Figure 1. Among the inhabitants of Bangkok, Diajpratham and Chad also found brisk walking to be the commonest form of leisure exercise[6]. Brisk walking is relatively, cheap, practicable and feasible for most age groups. There is a need for education on what constitutes adequate exercise, the forms of leisure exercise and on their effective use. Provision of pedestrian paths and recreation parks in communities and neighborhoods' will complement this effort.

Lack of time and an enabling environment were the two major barriers to leisure exercise reported. Widespread education on the importance of exercise to health is essential in this regard. This finding is different from the finding by Reichet et al and that of Aubertin-Leheudre et al that lack of

money and lack of energy were the commonest barriers to leisure exercise respectively[10,11]. Lack of money was not a barrier in this study possibly because recreational facilities were available at low or no cost for the respondents at the place of work. Different barriers to leisure exercise exist in different places and populations or contexts. In spite of the enabling working environment of the study population, a significant percentage still reported lack of enabling environment because they lacked the time to recreate at work and find the environment outside the work place unsuitable for physical exercise. It is thus imperative to identify the prevalent barriers in different study populations to effectively address the challenges. Employers of labour and policy makers must be made aware, through intensified advocacy, of their roles in promoting a healthy, fit and productive workforce through the creation of an enabling environment that promotes exercise, formulating supportive policies, providing exercise facilities in the workplace, sponsoring sporting events among employees and addressing specific barriers.

Work-related physical activity of the respondents were assessed as an aspect of physical activity in line with recommendations which acknowledge that all forms of physical activity contribute to favourable health outcomes and are vital in the evaluation of physical exercise[15]. The majority of the management staff (61.5%) were involved in sedentary jobs and yet only 11% of the management staff engaged in adequate leisure exercise (Tables 2 and 3). The reason for this is not far-fetched as most managers in the study population spend long days at work sitting for most of the time. Thus managers constitute an important exercise-at-risk subset of the workforce. Being leaders and role models, managers are key instruments for policy, structural, administrative and behavioural change in organizations. Similarly the level of education was found to have significant effect on the level of work-related activity. Only 4.5% of the staff without tertiary education were involved with sedentary jobs, compared with 25.6% of those with tertiary education. Conversely 88.0% of staff without tertiary education were engaged with jobs that involved significant physical activities

compared with 64.2% of their counterparts with tertiary education, (Table 3). This difference was statistically significant, $p < 0.05$. This is explained by the fact that the more highly educated tend to be involved in sedentary jobs and the less educated tend to be involved in active labour. This finding is similar to the findings by Xiaozing and Baker who found that work-related physical activity was less with the more educated class[16]. It is however noted that the level of work-related physical activity in the study location being an agricultural institute may be higher than in the general work force and the general populace.

Work-related physical activity had no effect on the level of leisure exercise, ($p > 0.05$), meaning that the respondents who were involved in sedentary jobs did not necessarily participate more in leisure exercise to make up for their inactivity at work. This should inform policy makers, employers of labour and employees of the need to institute deliberate measures including focused education targeting workers in sedentary jobs for leisure exercise programs in addition to general measures to make the whole population more active.

Combining work-related and leisure exercise reported by respondents showed that 88.2% of the respondents were physically active compared to assessment of exercise using leisure exercise alone where only 16% had adequate exercise. This finding is similar to what of Young et al who reported a significant increase from 18% to 41% in a group of men when the definition of physical exercise was broadened to include work-related activity.

Despite the high proportion of respondents who were on the whole physically active, a relatively high proportion of the respondents were either overweight (32.5%) or obese (12.1%) while less than half of the study population had good knowledge of obesity. This emphasizes the need for a holistic approach incorporating improvements in population dietary knowledge and practices in the control of overweight and obesity. Many studies have established however that significant health benefits accrue from exercise aside from its place in the control of obesity[2,5,6].

CONCLUSIONS

The study revealed that 11.8% of the study population was at risk of health problems due to inadequate physical activity and that 45% were either overweight or obese. The major barriers to the practice of leisure exercise were the lack of time and an enabling environment. Overcoming the tendency for sedentary life-style is a major challenge that should be addressed among the higher cadre staff through education targeted at this group. Public health education on what constitutes adequate exercise that will deliver health benefits is needed. Also, the fact that the knowledge of obesity did not translate to the practice of adequate leisure physical exercise in the study group, emphasizes the need for interventions that address barriers to exercise as well as engage in behavioural change communication to achieve the desired results.

ACKNOWLEDGEMENT

REFERENCES

1. Butler RN, Davis R, Lewis CB, et al. Physical fitness: benefits of exercising for the older patient. Geriatrics 53(10):46-62. 1998.

2. Jakicic JM, Otto AD. Treatment and prevention of obesity; what is the role of exercise. Nutrition review, Feb, 2006; 64 (2 Pt 2): 57-61.

3. Shehu RA, Abdullahi AA, Adekeye DS. Sedentary Lifestyle and Wellness in Kaduna State, Nigeria. Ethno Med. 2010; 4(1): 15-19.

4. Blair SN, Kohl HW, Gordon NF, Paffenbarger RS Jnr. How much physical activity is good for health? Annual review

public health, 1992; 13: 99-126.

5. Recommendations for Physical Activity Courtesy of Crow Tribal Health Courtesy of University of Montana Rural Institute Center for Excellence in Disability, Education, Research and Service Medicine & Science in Sports & Exercise [roundtable consensus]. Volume 31(11) Supplement 1, November 1999, p S542.

6. Diajpratham P, Chadchavalpananichaya N. Knowledge and Practice of physical exercise among the inhabitants of Bangkok. Nov. 2007; 90(11): 2470 8.

7. Young D.R., Miller K.W., Wilder L.B., Yanek L.R., Becker D.M. Physical Activity Patterns of Urban African Americans. Journal of Community Health, April 1998; 23 (2): 99-112.

8. Muntner P, Donfeng GU, Rachel PW, Jichun C, Wenqi Q, Paul K.W Jiang H. Prevalence of Physical Activity among Chinese Adults: Results from the International Collaborative Study of Cardiovascular Disease in Asia. American Journal of Public Health, 2005; 95:16311636.

9. Paulo SP, Brasil UF, Curitiba, PR. Perception of the environment and practice of physical activity by adults in a low socioeconomic area. Pública 2011; 45(2) [cited June 19, 2011]. Available from: www.scielo.br/rsp.

10. Reichert F F, Aluísio J, Barros D, Domingues M R, Hallal P C. The Role of Perceived Personal Barriers to Engagement in Leisure-Time Physical Activity. American Journal of Public Health, 2007; 97:515519.

11. Aubertin-Leheudre M, Rousseau S, Mélançon M O, Chaput J P, Dionne J I. Barriers to physical activity participation in North American elderly women: A literature review. American Journal of Recreation Therapy, 2005; 4(1): 21-30.

12. Araoye M.O. Subject selection: sample size determination. In: Research methodology with statistics for health and social sciences. Ilorin, Nigeria. Nathadex Publisher; 2003. P. 115-121.

13. Smith G.E., De Haven M.J., Grundig J.P., Wilson G.R. African-American Males and Prostate Cancer: Assessing knowledge levels in the community. Journal of the National Medical Association, 1997; 89(6): 387 391.

14. Livingstone M.B.E., Robson P.J., Wallace J.M.W., Mckinley M.C. How active are we? Levels of routine physical activity in children and Adults. Proceedings of the Nutrition society, 2003; 62: 681 701.

15. Guidelines for Data Processing and Analysis of the international physical ActivityQuestionnaire (IPAQ); short and Long Forms. Revised November 2005 [cited August 16, 2011] Available from: www.ipaq.k1.se .

16. Xiaoxing Z He, Baker DW. Differences in Leisure-time, Household, and Work-related Physical Activity by Race, Ethnicity, and Education. Journal of General Internal Medicine. 2005 March; 20(3): 259266.