Physical Activity Levels of Senior Secondary School Students in Ibadan, Western Nigeria

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ABSTRACT

Background: Inactivity and low levels of physical activity are predisposing factors to many chronic diseases such as heart disease which are showing an increase in prevalence in Sub-Saharan Africa generally and Nigeria in particular. Physical activity levels have been found to be decreasing among young people in many countries around the world resulting in a state where young people are not found to be sufficiently active in order to safeguard their present and future health and well-being.

Objective: This study was designed to assess the physical activity levels of students in government-owned senior secondary schools located in the South-east Municipality, Ibadan, Western Nigeria, and its association with their physical characteristics and level of study.

Subjects and Method: Multi-stage sampling was used to select participants from senior secondary schools. A modified version of the self-reported physical activity questionnaire for adolescents (PAQ-A) validated for Nigerian adolescents was used for data collection. One thousand and two questionnaires were distributed to the respondents. The questionnaire was designed to collect the respondents' demographic data and assess their physical activity levels. One thousand (1000) questionnaires were completed. Two of the 1002 questionnaires were not properly completed and were therefore discarded. The data were analysed using descriptive statistics of mean, standard deviation and cumulative percentage. A table was used to present the results. The chi-square test was used to determine the association between physical activity levels and the physical characteristics of the participants. Independent t-test was used to determine the difference in the physical activity levels of the participants.

Results: The results indicated that 38% of the participants engaged in low activity levels, 58.8% in moderate activity levels and 3.2% in high activity levels. Furthermore, physical activity levels (PAL) had significant positive associations with the physical characteristics of the participants and males appeared to be significantly more active than females.

Conclusion: Adolescents are not involved in adequate physical activities that could safeguard their present and future health and well-being. Therefore, it is recommended that there should be educational programmes in place which emphasize the benefits of exercise, primordial prevention of future chronic and cardiovascular diseases and also the incorporation of physical education in the secondary school curriculum.

Keywords: Education, health status, Nigeria, physical activity, students

Niveles de Actividad Física de los Estudiantes de la Escuela Secundaria Preuniversitaria en Ibadan, Nigeria Occidental

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RESUMEN

Antecedentes: La inactividad y los niveles bajos de actividad física constituyen factores de predisposición de muchas enfermedades crónicas tales como las cardiopatías, que en la actualidad

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experimentan un aumento de prevalencia en el África Subsahariana en general y en Nigeria en particular. Se ha constatado que los niveles de actividad física están disminuyendo entre la gente joven en muchos países alrededor del mundo. A consecuencia de ello, se produce un estado de cosas en el que las personas jóvenes no están suficientemente activas para salvaguardar su salud y bienestar presente o futuro.

Objetivo: *Este estudio fue diseñado para evaluar los niveles de actividad física de estudiantes en escuelas secundarias preuniversitarias del gobierno, situadas en la Municipalidad Suroriental, Ibadan, Nigeria Occidental, así como la asociación de dichos niveles con las características físicas y nivel de escolaridad.*

Sujetos y método: *Se usó un muestreo por etapas múltiples para seleccionar a los participantes de las escuelas secundarias preuniversitarias. Para la recolección de datos se usó una versión modificada del cuestionario de autoreporte de las actividades físicas para los adolescentes (PAQ-A) validado para adolescentes Nigerianos. Mil dos (1002) encuestas se distribuyeron entre los encuestados. Las encuestas fueron diseñadas para recoger datos demográficos de los encuestados y evaluar sus niveles de actividad física. Se completaron mil (1000) encuestas. Dos de las 1002 encuestas no se completaron correctamente y por lo tanto se descartaron. Los datos fueron analizados mediante estadísticas descriptivas de media, desviación estándar y porcentaje cumulativo. Se usó una tabla para presentar los resultados. La prueba de chi-cuadrado fue usada para determinar la asociación entre los niveles de actividad física y las características físicas de los participantes. La prueba "T" independiente fue usada para determinar la diferencia en los niveles de actividad física de los participantes.*

Resultados: *Los resultados indicaron que 38% de los participantes tenían niveles bajos de actividad, 58.8% Niveles moderados de actividad, y 3.2% niveles altos de actividad. Además, los niveles de actividad (NAF) mostraban niveles significativos de asociaciones positivas con las características físicas de los participantes y los varones parecían ser significativamente más activos que las hembras.*

Conclusión: *Los adolescentes no toman parte en actividades físicas adecuadas que podrían salvaguardar su salud y bienestar presente y futuro. Por consiguiente, se recomienda que se desarrollen programas educativos que enfaticen los beneficios del ejercicio, la prevención primordial de futuras enfermedades crónicas y cardiovasculares, así como la incorporación de educación física en el plan de estudios preuniversitarios.*

INTRODUCTION

Physical activity is generally seen as a broad term used to describe all forms of large muscle movements including sports, dance, game, work, lifestyle activities and exercise for fitness (1). It is also defined as any body movement carried out by skeletal muscles which require energy production (2). Exercise is a planned physical activity which should be performed repetitively to develop or maintain fitness. Regular physical exercise is also regarded as an important healthy lifestyle in which a large number of people can participate in order to impact significantly on their health status (1, 2).

Emphasis has been placed in awareness programmes on the benefits of physical activities to encourage participation in regular physical exercises as a means of promoting good health (3). According to the American Heart Association (4), a sedentary lifestyle has been identified as a primary risk factor for heart disease, thus indicating that activity is of primary importance in preventing diseases and in particular lifestyle diseases. It has been shown that a sedentary lifestyle is a major underlying cause of death, disease and disability with about 2 million deaths every year attributable to physical inactivity. It has also been shown that physical inactivity doubles the risk of developing cardiovascular diseases, Type 2 diabetes and obesity while also increasing the risk of colon and breast cancer, hypertension, lipid disorders, osteoporosis, depression and anxiety (5). It has been reported that appropriate participation in some form of physical activity assists young people to develop healthy musculoskeletal tissues (bones, muscles and joints), a healthy cardiovascular system (heart and lungs) and neuromuscular awareness (coordination and movement control). It also assists in maintaining a healthy bodyweight and has been shown to have psychological benefits such as an improvement in control over anxiety and depression (6). Bechtel (7) reported that participation in regular physical activity or sports is associated with less substance abuse and supports positive feelings towards school attendance. It is also known to reduce healthcare costs, increases productivity and renders better performance in sports and recreational activities (5).

Despite the numerous benefits of physical activities, physical activity levels are reported to be decreasing among young people in countries around the world, especially in poor, urban areas where it is estimated that less than one-third of young people are adequately engaged in physical activities. This decline is believed to be largely due to increasingly common sedentary lifestyles, lack of emphasis on the importance of physical education and reduction in other school-based physical activities. The downward trend in the physical activity pattern found in adolescents could also be attributed to the fact that the pre-adolescence-adolescence stage of life marks the beginning of a critical development transitional stage during which many youths have a tendency to become sedentary (8).

Data on physical activities in developed countries such as America, Canada, Australia, Europe and from a few developing countries such as China are available (9, 10). However, no similar data seem to be available on Nigerians and Nigerian youths.

This study was performed to assess the physical activity levels of male and female senior secondary school students in the South-east Municipality, Ibadan, Oyo state in the Western part of Nigeria, to compare the physical activity levels of male and female senior secondary school students and also to assess the association between physical activity levels and physical characteristics of the students. It is our belief that this study will provide some information on the physical activity levels of the students in this locality to provide an insight on the physical activity levels of students in Ibadan. It could also potentially identify the need for development of programmes for primary prevention of chronic diseases such as cardiovascular disease among young people.

SUBJECTS AND METHODS
Participants
One thousand and two senior secondary school students in the South-east Municipality, Ibadan, Western Nigeria, participated in this study. Out of the 1002, 1000 properly completed their questionnaires, the two improperly completed ones were discarded and were not used in the analysis of the results.

Sampling was carried out in stages: **Stage 1** was selection of the location of study which was the Ibadan north east local government area out of five local governments. This was the sampling of convenience. **Stage 2** involved the selection of schools using simple random sampling where two schools were selected and Stage **3** was selection of the students, here all consenting students participated in the study therefore the third stage considered the whole population. The Study design was cross-sectional.

Ethical approval for the study was sought and obtained from the Joint University of Ibadan (UI)/University College Hospital (UCH) Institutional Review Committee before commencement of the study. Permission was received from school principals and the local education authority and an informed consent was obtained from each participant of the study.

The modified physical activity questionnaire for adolescents (Modified PAQ-A), a self-administered 7-day recall instrument, was used for data collection. The modification made was the inclusion of activities that are common with Nigerian adolescents. This questionnaire previously developed and validated by Kowalski *et al* (11) was used to assess general levels of physical activity for senior secondary school students between the ages of 14 and 19 years old. The PAQ-A questionnaire was pre-tested for validity in the target population and another questionnaire was attached with questions to assess any difficulties encountered by respondents in completing the PAQ-A. About 70% of the respondents had problems in understanding some of the questions of PAQ-A. The researchers explained some of the words, replaced some of the questions and added others including some culture-specific activities as suggested by the respondents. The modified PAQ-A was pre-tested again in the target population until the respondents reported no further problem/difficulty in completing the questionnaire. This process was used to validate the content of the modified PAQ-A as stated by Beaton *et al* (12). The modified PAQ-A was distributed to respondents in a classroom setting and they were encouraged to complete the questionnaire independently.

The questionnaire had 9 questions out of which eight questions were used to calculate activity level of the students. Question one had a list of activities and frequency in the last seven days *eg* bicycling- 0 time a week is scored 1, 1−2 times a week is scored 2, 3−4 times a week is scored 3, 5−6 times a week is scored 4 and 7 times a week is scored 5. Questions 2−8 assessed type of activity/intensity. *Example: 'In the last seven days, during your physical education class how often were you very active(playing hard, running, jumping, throwing).'* Scoring goes with intensity of activity; no PE−1, Hardly ever − 2, sometimes − 3, quite often − 4, always − 5. All questions were given scores as 1, 2, 3, 4 or 5. A score of 1 was assigned for low activity, 2 − 4 for moderate activity and 5 was assigned for high activity. The body weight and height of the subjects were taken correctly and the body mass index (BMI) calculated as body weight in kg/height in m^2. The BMI was used to classify participants as underweight, normal, overweight and obese using WHO global database on body mass index (6).

Descriptive statistics of mean, standard deviation and cumulative percentage was used appropriately to process the data. The physical activity level was compared between male and female students using the Mann-Whitney U test. The chi-square method was used to determine the association between the following: BMI and physical activity level, gender and physical activity level and level of study (educational level) and physical activity level. Significance level was put at 0.05.

RESULTS

Results of 1000 senior secondary school students aged 14 to 19 years who completed the modified PAQ-A questionnaires are presented. The ages of the respondents ranged from 14−19 years with mean 16.17 (SD = 1.59) years. The respondent's ages were categorized into young adolescent (14−16 years) and older adolescents (17−19 years). The majority of the students who participated in this study were females, 519 (51.9%) and 481 (48.1%) males. Participants involved in this study consisted of 285 (28.5%) senior secondary 1 (SS1) students, 308 (30.8%) SS2 students and 407 (407%) SS3 students. Body Mass Index of the participants was classified as normal, underweight, overweight and obese. It was found that 85.9% of the participants had normal weight; 4.1% were underweight, 8.8% overweight while 1.2% were obese. This indicates that just over 14% of participants showed abnormal weight (about 9% overweight and slightly over 1% obese).

The physical activity levels were classified as low, moderate and high. Thirty-eight per cent (380) of the participants were reported to have low activity, 58.8% (588) had reported moderate activity and 3.2% (32) had high activity.

Two hundred and seventeen (35.5%) of the young adolescents showed low activity, 372 (60.9%) showed moderate activity and 22 (3.6%) showed high activity. One hundred and sixty-three (41.9%) of the older adolescents were reported to have low activity, 216 (55.5%) reported moderate activity and 10 (2.6%) reported high activity.

One hundred and seventy-three (36%) male participants were reported to have low activity, 285 (59.3%) had moderate activity and 4.8% had high activity. Also, 207 (39.9%) female participants were reported to have low activity, 303 (58.4%) had moderate activity and 9 (1.7%) had high activity.

Ninety-eight (34.4%) of the participants in SS1 were reported to have low activity, 181 (63.5%) had moderate activity and 6 (2.1%) had high activity. One hundred and nineteen (38.6%) of the participants in SS2 reported low

activity, 176 (57.1%) had moderate activity and 13 (4.2%) had high activity. In this study, 163 (40.0%) of the participants in SS3 were reported to have low activity, 231 (56.8%) had moderate activity and 13 (3.2%) had high activity.

Eighteen (43.9%) of the underweight participants reported low activity, 23 (56.1%) reported moderate activity and none reported high activity. Furthermore, 330 (38.4%) participants with normal weight were reported to have low activity, 504 (58.7%) reported moderate activity and 25 (2.9%) reported high activity. Also, 29 (33.0%) of the overweight participants were reported to have low activity, 52 (59.1%) reported moderate activity and 7 (8.0%) reported high activity. It was noted that 3 (25.0%) of the overweight participants reported low activity, 9 (75.0%) reported moderate activity and none reported high activity.

The Mann-Whitney U test was used to compare the PAL scores between male and female students using two-tailed tests of significance. Males were more significantly physically active than females ($p = 0.05$).

The chi-square test was used to test the association between PAL and the physical characteristics (age, gender, and BMI) and class of study of the participants and this is illustrated in Table 1. The respondents were considered to have low, moderate and high activity levels based on the scores of 1, 2−4 and 5, respectively and this was cross-tabulated with the physical characteristic variables. The chi-square test indicated that there was a significant association ($p = 0.018$) between PAL and age, a significant association ($p = 0.016$) between PAL and gender. Also a significant association ($p = 0.0283$) between PAL and class of study was observed as well as a significant association ($p = 0.0114$) between PAL and BMI.

DISCUSSION

The respondents' age ranged from 14 to 19 years being predominantly young adolescents (14−16 years of age). The majority of the participants were females (51.9%) and 48.1% were males. This is in contrast to the fact that there are more

Table 1: Physical characteristics and physical activity levels distribution

Physical Characteristics and class of study		Physical Activity level				X^2	P-value
		Low	Moderate	High	Total		
Age	Young adolescents	216 (35.5%)	370 (60.9%)	22 (3.2%)	608 (60.8%)	4.499	0.018
	Older adolescents	164 (41.8%)	218 (55.6%)	10 (2.6%)	392 (39.2%)		
Gender	Male	173 (36%)	285 (59.3%)	23 (4.8%)	481 (48.1%)	8.286	0.016
	Female	207 (39.9%)	303 (58.4%)	9 (1.7%)	519 (51.9%)		
Class of Study	SS1	98 (34.4%)	181 (63.5%)	6 (2.1%)	285 (28.5%)	5.040	0.028
	SS2	119 (38.6%)	176 (57.1%)	13 (4.2%)	306 (30.6%)		
	SS3	163 (40.0%)	231 (56.8%)	13 (3.2%)	407 (40.7%)		
BMI	Underweight	18 (43.9%)	23 (56.1%)	0 (0%)	31 (3.1%)	10.266	0.011
	Normal weight	330 (38.4%)	504 (58.7%	25 (2.9%)	859 (85.9%)		
	Overweight	29 (33.0%)	52 (59.1%)	7 (8.0%)	88 (8.8%)		
	Obese	3 (25.0%)	9 (75.0%)	0 (0%)	12 (1.2%)		

males in the Nigerian population than females according to the 2006 census (13). This may be due to the greater willingness of females when compared with males to participate in the study and is probably coupled with the fact that females have a better disposition to healthcare issues than males. It was further observed that about 10% and 1% of the participants were overweight and obese respectively. The prevalence rate of overweight and obesity among the study population was found to be low when compared to available data from Western countries. For instance, it is reported that over 30% of American children and adolescents (14), and 20 to 25% of Australian adolescents are obese (15). The difference in prevalence could possibly be attributed to the area of the study being a semi-urban area where the population has not yet adopted westernized lifestyle.

The physical activity levels of the participants were classified into three categories: low, moderate and high with 58.8% (highest percentage) of the respondents involved in moderate activities while 18% showed low activity compared to 1.2% who were found to be involved in high level activities. This indicates that many of the participants (38%) were not involved in sufficient physical activity in order to maintain good health since a moderate to vigorous activity is required to be of meaningful benefit. This is in agreement with the findings of Bailey et al (16) who reported that the majority (58%) of the children (boys and girls) who participated in their study were found to be involved in average activity. Also, our findings are in agreement with Heinonen et al (17) who reported that all the subjects in their study (female adolescents) were found to be moderately active. The findings also corroborate with the results of Pate et al (18) who reported that girls spend more time on low to moderate activities (820 mins/day) as compared to vigorous activity (6 mins/day). Inactivity in the majority of the adolescents (38%) is considered to be a warning signal of future chronic and cardiovascular disease such as heart disease and hypertension as identified by the American Heart Association (4). According to Pate et al (19), the general physical activity recommendation to enhance health involves at least 30 minutes of moderate to intense physical activity on most days of the weak. Findings of the preset student may also be considered to be a reflection of a lack of physical education in the secondary school curriculum and inadequate provision of facilities for sport activities in schools and communities.

Physical activity levels were observed to be higher in young adolescents than in the older adolescents and this is in conformity with the findings of Trost et al (20). Kimm et al (21) and Thompson et al (22) who reported that PAL decrease with age in both boys and girls. Physical activity levels was also observed to increase with the level of study from SS1 to SS3. Furthermore, PAL was shown to decrease with increasing BMI and this is consistent with the findings of Kimm et al (23) which showed that a higher BMI is related to a decline in activity among girls whether of African descent or Caucasian.

Females participated more in low and moderate activities while the males participated more in high activities. This can be viewed as a behavioural habit as females tend to engage more in low and moderate activities than males who tend to engage in more vigorous activities. When the PAL scores were compared between males and females, the Mann-Whitney U test revealed that males were found to be significantly more active than females. This is consistent with the study of Kowalski et al (11) who reported that males were more active than females (mean scores of 2.52 and 2.12, respectively) and the study of Rosendo da Silva and Malina (24) which showed that males were more active than females with a mean score of 2.3 (SD = 0.6, $p < 0.01$) compared to that of females 2.0 (SD = 0.6, $p < 0.01$).

Significant positive associations were found between the PAL and physical characteristics (age, gender, level of study and BMI) of participants using the chi-square test ($p < 0.05$). It was shown that there was a significant association between PAL and gender and this is in agreement with the findings of Crocker et al (25) in which a significant association between PAL and gender was reported.

There was also a significant association between PAL and age which is in conformity with the studies of Trost et al (20), Kimm et al (21) and Thompson et al (22) who all reported that there was a significant association between physical activity and age in both boys and girls.

In this study, PAL was reported to be significantly associated with the participants' level of study. This may be a reflection of the fact that a larger percentage of participants in this study were in SS3 (higher secondary level) and they may have greater knowledge of physical activity and its benefits.

A significant association between PAL and BMI was observed. This is in agreement with the findings of Crocker et al (25) which showed that PAL is significantly positively associated with BMI and that of Kimm et al (21) which showed that a higher BMI was associated with a decline in physical activity among adolescents in persons of African ancestry and in Caucasians ($p < 0.05$).

Based on the results of this study, we wish to report that a significant number of adolescents were not involved in adequate physical activities that could safeguard their present and future health and well-being. The results of this study, thus provides baseline information on the physical activity levels of senior secondary students in Ibadan, Western Nigeria, and also the relationship between PAL and their physical characteristics.

Based on the result of this study, the following recommendations are offered:

* Further studies involving larger population groups should be conducted in other parts of the city (Ibadan) and other parts of Nigeria to determine the levels of physical activity of adolescents in order to facilitate the formulation of appropriate policies that

will promote participation in health-enhancing physical activities.

* Additional studies should be carried out to determine barriers to participation and access to facilities for enhancing physical activity among adolescents in Ibadan, in particular, and Nigeria in general.

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