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Influence of ICT Use on Body Composition and Sedentary Death Syndrome (SeDS) Risk among University of Ilorin Sandwich Students

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Abstract. The ever-increasing demand for ICT has made it a leading cause of sedentariness, which is deleterious to health and wellbeing in several ways. The study examined Influence of ICT Use on Body Composition and Sedentary Death Syndrome (SeDS) Risk among University of Ilorin sandwich students. Ex-post facto research design was adopted. The population was all University of Ilorin sandwich students registered in 2015 contact session. Simple random sampling and proportionate stratified sampling was adopted to select 426 students. Standardized instruments, which consisted of portable stadiometer, body fat/hydration monitor scale and non-elastic tape rule, were used to assess body composition. Self-reported ICT use and physical activity level were obtained using modified Global Physical Activity Questionnaire (GPAQ). Pilot test was conducted to recalibrate and ascertain functionality of the body composition instruments while the questionnaire was validated by experts and subjected to test retest for reliability. A coefficient of 0.77r was obtained as evidence of its reliability. Data were analyzed using charts, descriptive statistics of percentage, mean, and standard deviation as well as inferential statistics of Pearson Product Moment Correlation. Hypotheses were tested at statistical significance of 0.05. A significant relationship was found between ICT use and sedentariness while excessive body fat was a major indicator for SeDS among University of Ilorin sandwich students. The researchers recommended that student should habitually exercise for at least 30 minutes on 3-5 days weekly; sit less and move more daily and take 3-5 minutes of physical activity breaks after every hour of continuous ICT use.

Keywords: Body Composition, Disease, Health, Physical Activity, ICT use, Sedentariness

1. Introduction

The human genetic evolution was based on hunting and gathering, involving vigorous intensity physical activities. However, in the current sedentary culture vigorous physical activity has become a missing link in the lives of many individuals while moderate physical activity is on a rapid global decline. Prince et al (2015) observed that ICT is the greatest environmental correlate of sedentariness among youths especially students of tertiary institutions. Meanwhile, a large number of tertiary institution students in Nigeria may not be meeting daily physical activity recommendations even though physical activity as argued by Talabi (2016) is the easiest, cheapest, most accessible and most reliable means to attain health, fitness and wellness. Akinroye (2014) observed that only 49.9%-59% of university students in Nigeria engaged in 30 minutes of moderate-to-vigorous physical activity (MVPA) for at least 5 days weekly. He also discovered that more female students were sedentary than male students. Several authorities have also linked sedentariness with unhealthy body composition

parameters that increases susceptibility to SeDS and reduces the quality of peoples' lives.

Information Communication Technology (ICT) covers all forms of computer and communication equipment and software used to create, store and manipulate information in various formats (Yusuf & Daramola, 2015). Mobile phones, tablets, computer and television sets are the most powerful and most common ICT tool across diverse groups of people in Nigeria. The diffusion of these devices among Nigerians as well as globally has been of remarkable speed. Sachs et al (2015) observed that the uptake of mobile phones, computers, the internet, and social media, have been the fastest adoptions of technology in human history. Hence, every aspect of living in the contemporary world is ICT driven.

Sedentariness refers to activities that generate very low energy expenditures of ≤1.5 metabolic equivalents (METs) during waking hours. Sedentariness comprises activities such as prolonged sitting/reclining, and occurs across the domains of work, study, travel, and leisure (Healya & Owena, 2010; Dominic, Seidina, Williams, Oyerinde, Olaitan & Onifade, 2014). Common sedentary behaviours, such as ICT use, sitting at school, work and leisure have MET values of ≤1.5. In addition, Sedentary Behaviour Research Network (SBRN, 2012) noted that moderate physical activities (PA) like brisk walking, involves an energy expenditure of 3-5.9METs, running and vigorous sports can involve energy expenditures of ≥6METs. Sedentariness ranks first among the global cause of preventable deaths (Dominic et al, 2014) and fourth among the risk factor for global mortality (Akinroye, 2014). The prevalence of sedentariness among Nigerian adults is 40%; about 3 million chronic diseases deaths are attributed to sedentariness in the world yearly (Maiyaki & Garbati, 2014; Adebayo, 2015). In 2013, the estimated prevalence of chronic diseases in Nigeria was 24% (499,920 deaths), (World Health Organisation, 2014).

Sedentary Death Syndrome (SeDS) is a term used to categorize the emerging entity of more than 35 types of sedentariness-mediated diseases that ultimately increase morbidity and mortality (Katch, McArdle, & Katch, 2011). Individuals who have risky body composition such as overweight and obesity, which often manifest as excessive body fat percentage, high waist and hip circumferences are highly predisposed to risk of arthritis, type 2 diabetes, hypertension, endometrial cancer and premature mortality from all causes (Dominic, Onifade and Lajide, 2010). These are common indicators of SeDS that everyone can avoid via adequate nutrition, sufficient physical activity, proper stress management and abstinence from drug abuse in order to stay healthy and fit. Katch (2011) highlighted weak skeletal muscles, low bone density, hyperglycemia, low serum high-density lipoprotein (HDL), low physical endurance, physical frailty, resting tachycardia and low quality of life as a set of symptoms that characterizes SeDS. Authorities including Lees and Booth (2004); Ojiambo (2013); Adebayo (2015) maintained that there exist a deleterious effect with greater risks for morbidity and mortality among those who spend a large portion of their day being sedentary, regardless of whether they engage in regular moderate-to-vigorous intensity physical activity (MVPA). This implies that sedentariness is dangerous even in athletes. However, a dose response exists between physical activity level and the dangers of sedentariness (Garber, Blissmer, Deschenes, Franklin, Lamonte, Lee & Swain, 2011; Ojiambo, 2013; Omonu, 2015). In other words, increasing physical activity level has significant impact in minimizing the risk of sedentariness and improving health, fitness and overall wellbeing.

2. Interaction of ICT Use Body Composition and SeDS

ICT use is associated with uncontrolled sedentariness, reduced energy expenditure and energy surplus that is often deleterious to health in several ways. Within a day, sedentary behaviour may induce negative effects on relatively fast acting cellular processes in skeletal muscles or other tissues regulating risk factors like plasma triglycerides, HDL cholesterol and metabolic toxins. Thyfault, Du, Kraus, Levine and Booth (2014) submitted that sitting for prolonged periods would also cause

the loss of opportunity for effective gaseous exchange as well as cumulative energy expenditure resulting from the thousands of intermittent muscular contractions throughout waking hours.

In addition, ICT users are increasingly being exposed to adverts promoting unhealthy foods and unhealthy eating habits such as passive over eating and frequent eating out (Maiyaki & Garbati, 2014). There are many fast food restaurants and food vendors serving meals and snacks often containing a lot of salt, sugar, preservatives and saturated fat (Ejiofor, 2015). As noted by Arulogun and Owolabi (2011), this kind of meal go hand in hand with an increase in the availability of different kinds of soft drinks and fruit juices, which are becoming fashionable and fast replacing natural fruits.

These eateries and food vendors are both on campus, off campus, and are patronised by people across all economic bands of the society including tertiary institution students. This may have chronic effects on the propensity for the primary risk factors for SeDS such as high glycaemic index, excessive body fat, increase waist and hip circumference, overweight, obesity, or even susceptibility to other degenerative or chronic diseases that characterize SeDS (Hamilton, Hamilton & Zderic, 2007; Graham & Schlesinger, 2012; Thyfault et al, 2014). Therefore, the objective of this study was to examine the correlation between ICT induced-sedentariness, body composition and risk of SeDS among University of Ilorin Sandwich Students.

3. Statement of the Problem

ICT use is popularly believed to increase efficiency in performing multifarious tasks. However, recent studies indicated that ICT use increases sedentariness in individuals (Canfield, 2012; Dominic et. al, 2014; Adebayo, 2015). Sedentariness is associated with reduction in energy expenditure, body fat accumulation and different types of chronic diseases. Most of the University of Ilorin sandwich students are civil servants who often engaged in sedentary jobs that require the use of ICT for several hours daily are also exposed to crash academic programme that increasingly demand the use of ICT with little or no time to engage in physical activity.

In addition, many of them appear to be overweight and tend to gain more weight. This could be an indication of risk of chronic diseases due to increased ICT-mediated sedentariness. Limited Knowledge however, exist to prove or refute this assumption hence this study was conducted to determine the relationship between ICT use, body composition and SeDS among University of Ilorin sandwich students.

4. Research Question

What is the physical activity level of Unilorin sandwich students?

5. Hypotheses

H_{o1}: ICT use among University of Ilorin Sandwich students has no correlation with sedentariness.
H_{o2}: ICT use among University of Ilorin Sandwich students has no correlation with body composition (BMI, WHR, WC and %BF).
H_{o3}: ICT use among University of Ilorin Sandwich students has no correlation with Sedentary Death Syndrome (SeDS).

6. Methodology

The study adopted ex-post facto research design. The population was all registered 2015 contact undergraduate sandwich students of University of Ilorin. A sample of 426 students was drawn from the population, which consisted 12 departments. Multistage sampling technique was adopted in selecting the sample. It included stratified random sampling to select five departments that were distributed as follows: Human Kinetics Education (HKE) 312, Health Promotion (HP) 384, Educational Management (EMA) 392, Counselling Education (CED) 308 and Arts Education (AED) 344. Finally, recommendation of The Research Advisors (2006) was adopted to draw a proportionate sample of ¼ from each of the sampled departments.

Body composition instruments were standardised and consisted portable height scale for measuring height, two birds non-elastic tape rule for measuring waist and hip circumferences and body fat/hydration monitor scale (model number 7032497) for measuring body weight and %body fat. The Global Physical Activity Questionnaire (GPAQ) was adapted to collect self-reported physical activity level and ICT use. Pilot test was conducted to recalibrated and assess functioning of body composition instruments. Three experts, two from the Department of Human Kinetics Education and one was from the Department of Anatomy and Physiology of University of Ilorin validated the questionnaire. Test retest was conducted to determine the reliability of the questionnaire and Pearson's (r) of 0.77 was obtained. ICT was delimited to mobile phones, tablets/i-pads, computers, and television sets. Pregnant women, sick respondents and those who did not complete both stages of the test were excluded. Only validly completed questionnaire were used for data analysis. The version 20.0 of IBM SPSS software was used for data analysis. Statistical analysis was percentage, mean, standard deviation and PPMC with alpha level ≤ 0.05.

7. Results

Table 1: Distribution of Demographic Characteristics of University of Ilorin Sandwich Students

Age Range	**N**	**%**
18-23 yrs	73	17.1
24-28 yrs	129	25.3
29-33 yrs	88	36
39-43 yrs	83	19.5
44-48 yrs	34	8
49-53 yrs	4	0.9
Total	**426**	**100**
Gender	**N**	**%**
Female	226	53.1
Male	200	46.9
Total	**426**	**100**
Marital Status	**N**	**%**
Single	201	47.2
Married	209	49.1
Divorced	16	3.8
Total	**426**	**100**
Department	**N**	**%**
EMA	98	23.0
AED	86	20.2
CED	79	18.5
HKE	73	17.1
HP	90	21.1
Total	**426**	**100**

Demographic characteristics of the respondents are shown in table 1. The age range with highest frequency was 24-28 years with 129 (25.3%) respondents and the age range with lowest frequency was 49-53 years with 4 (0.9%) respondents. There were more females 226 (53.1%) than males 200 (46.9%).

Table 2: Descriptive Analysis Showing Body Composition Variables of University of Ilorin Sandwich Students

VARIABLES	CATEGORIES	Male		Female	
		N	%	N	%
Waist Circumference (cm)	Low Risk	182	91.0	95	42.0
	Increased Risk	16	8.0	54	23.9
	Substantially Increased Risk	2	1.0	77	34.1
	Total	**200**	**100**	**226**	**100**
Waist- to-Hip Ratio (cm)	Normal	165	82.5	137	60.6
	Risky	35	17.5	89	39.4
	Total	**200**	**100**	**226**	**100**
Body Mass Index (Kg/m^2)	Underweight	12	6.0	10	4.4
	Normal	137	68.5	113	50.0
	Overweight	33	16.5	46	20.4
	Obese Class I	18	9.0	39	17.3
	Obese Class II	0	0	14	6.2
	Obese Class III	0	0	4	1.8
	Total	**200**	**100**	**226**	**100**
Percentage Body Fat	Below Healthy	7	3.6	2	0.9
	Healthy	120	65.1	78	34.5
	Above healthy	43	22.1	18	8.0
	Dangerously unhealthy	25	5.3	115	50.9
	Total	**200**	**100.0**	**226**	**100**

Table 2 shows the descriptive analysis of the body composition variables of University of Ilorin sandwich students. The result for waist circumference (WC) revealed that majority of the male 182 (91%) had low risk, 16 (8.0%) of them had increased risk and 2 (1.0%) of them had substantially increased risk. Waist circumference of the female revealed majority had low risk 95 (42.0%). However, many of them are in the risky category; 54 (23.9%) had increased risk while 77 (34.1%) had substantially increased risk. The results for BMI revealed that majority of the male 137 (68.5%) had normal weight, 12 (6.0%) were underweight, 33 (16.5%) were overweight and 18 (9.0%) were obese class I. For females, 113 (50%) of them were normal weight, 10 (4.4%) were underweight, 46 (20.4%) overweight, 39 (17.3%) were obese class I, 14 (6.2%) were obsess class II and 4 (1.8%) obese class III.

Answer to the Research Question

What is the physical activity level of Unilorin sandwich students?

Table 3: Physical Activity Level of University of Ilorin Sandwich Students

Intensity	Both Gender			Male			Female	
	N	%	MET-min·wk^{-1} ($\bar{x}$±SD)	MET-min·wk^{-1} ($\bar{x}$±SD)	N	%	MET-min·wk^{-1} ($\bar{x}$±SD)	N	%
LihgtS intensity PA	176	41.3	180-520 (140±47)	180-480 (140±47)	68	34.0	140-520 (171±161)	108	47.8
Moderate intensity PA	220	51.6	600-2940 (1275±828)	600-2140 638±414)	111	55.5	600-1480 (293±167)	109	48.2
Vigorous intensity PA	30	7.0	600-2880 (1620±794)	600-960 (481±230)	21	10.5	600-1440 (702±469)	9	4.0
Total	**426**	**100**			**200**	**100**		**226**	**100**

Table 2 shows descriptive analysis of the physical activity level (PAL) of University of Ilorin sandwich students. The result indicates that 176 (41.3%) of them performed light intensity PA expending a mean MET-min·wk^{-1} of 140 ± 47, 220 (51.6%) of them performed moderate intensity PA with a MET-min·wk^{-1} of 1275 ± 828, while just 30 (7.0%) of them performed vigorous intensity PA with a MET-min·wk^{-1} of 1620 ± 794. This implies that majority of them perform MVPA·wk^{-1} and met the WHO (2011) recommendation for PA. However, the result revealed that more male 111 (55.5%) performed the recommended PA than female 109 (48.2%).

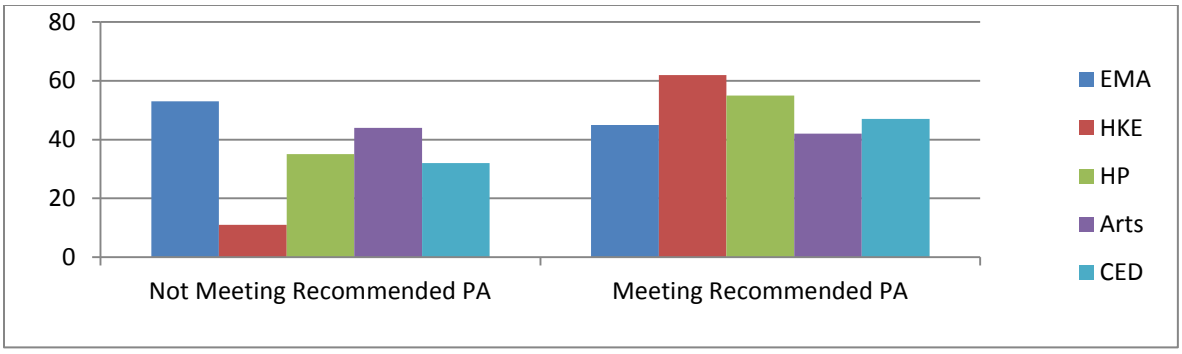

Figure 1: Unilorin Sandwich Student's Compliance to Physical Activity Recommendation

In addition, figure 1 showed that majority of the participants who performed the recommended PA were students of Hunan Kinetics Education (HKE) while majority of those who did not perform the recommended PA were students of Education Management (EMA). Similarly, figure 2 revealed that majority of those who perform vigorous intensity PA were students of HKE, none of the Counsellor Education (CED) students performed vigorous intensity PA. Majority of those who performed moderate PA were CED students while the EMA students performed the lowest amount of moderate PA. Majority of the EMA students perform low intensity PA while HKE students performed the lowest amount of low intensity PA.

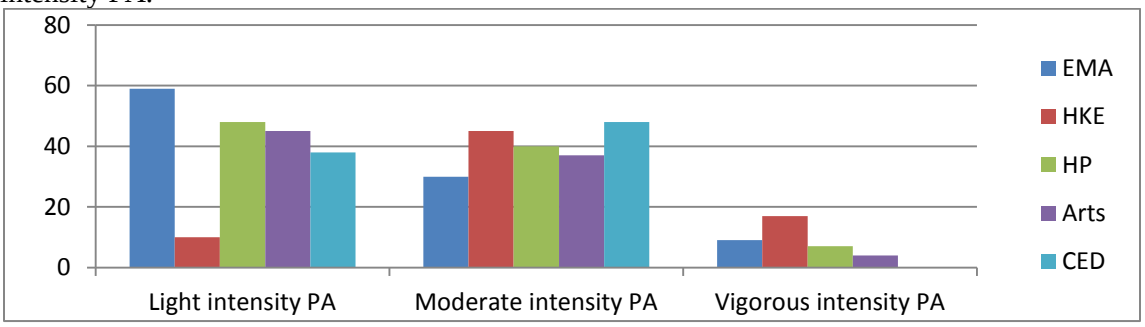

Figure 2: Physical Activity Level (MET-mins·wk^{-1}) among Departments

8. Hypotheses Testing

Table 3: Pearson Correlation Showing the Relationships between ICT Use, Sedentariness, Body Composition and SeDS

H_{o1}: Correlation between ICT Use and Sedentariness among University of Ilorin Sandwich Students					
		n	**r**	**r^2**	**Sig**
ICT Devices	**Sedentariness**	426	.61	37.2%	.05
H_{o2}: Correlation between ICT Use and Body Composition of University of Ilorin Sandwich Students					
	Body Composition (AC)	**n**	**r**	**r^2**	**Sig**
ICT Devices	BMI	426	.13	1.7%	.05
	WHR		.02	-	.73
	WC		.02	-	.66
	%BF		.57	32.4%	.01
H_{o3}: Correlation between ICT Use and SeDS among University of Ilorin Sandwich Students					
	Body Composition (ANC)	**n**	**r**	**r^2**	**Sig**
ICT Devices	BMI	426	.38	15%	.05
	WHR		.81	66%	.01
	WC		.37	14%	.05
	%BF		.19	3.6%	.008

p≤0.05; AC-All categories; ANC- Above normal category

Table 3 shows the results obtained from the tested hypotheses. Hypothesis 1 reveals a strong positive correlation between ICT use and sedentariness among University of Ilorin Sandwich students (n = 426, R = .61) and this result is significant at .05 alpha level. This means that higher ICT time is associated with increase in sedentariness among the participants. The coefficient of determination (r^2), indicates that the level of ICT use account for about 37.2% variation in sedentary behaviour of the participants.

In Hypothesis 2, the relationship between ICT use and body composition was tested considering all categories (below normal, normal and above normal). A positive low to moderately high correlation was found between ICT use and BMI and %BF (n = 426, r = .13 and .57; r^2 = 1.7% and 32.4%; p = .05 and .01) respectively. This indicates that increase in the participants' ICT use was associated with slight increase in their BMI but a high increase in their overall body fat. The difference in the level of ICT use accounts for about 1.7% changes in BMI and about 32.4% changes in %BF of the participants respectively. On the other hand, there was no significant correlation between ICT use and WHR and WC (r = .02; p = .73 and .66) respectively.

Hypothesis 3 tested the relationship between ICT use and sedentary death syndrome (SeDS). In order to determine this, only participants whose body composition scores are above normal category were considered. A positive low to high correlation was found between ICT use and all the tested body composition variables (r = .38, .81, .37, .37 and .19; r^2 = 15%, 66%, 14% and 3.6%; p = .05, .01, .05 and .008) for BMI, WHR, WC and %BF respectively. Previous studies report that increases in body composition above normal are some of the major symptoms of SeDS. This finding is therefore, an indication that excessive use of ICT among the participant is associated SeDS. The coefficients of determination revealed that BMI has the highest level variability while %BF has the lowest.

9. Discussion

This study was conducted on a sample of 426 sandwich students of University of Ilorin aged 18 – 53 years. Majority of them reported performing the recommended physical activity however; results proved that their physical activity levels were not sufficient to improve their body compositions. All of the body composition variables assessed: WC, WHR, BMI and %BF indicated a low to high risk of SeDS. The females had higher risk variables, among those who had above normal body composition, 24 of them had %BF ≥40, 32 of them had WC ≥90cm, 6 of them had BMI ≥40 and 25 of them had WHR ≥90. This suggests high amounts of body fat around the abdominal region as well as other parts of their bodies.

The finding of this study revealed that 41.3% of the participant did not perform physical activity as recommended by the WHO (2011). This figure is very high and explains the participants' high levels of body composition variables. More females performed low intensity PA than males. This finding is similar to the opinion of Adebayo (2015) that the prevalence of sedentariness among Nigerian adults is 40%. Their PAL is even lower compared to the repot of Adegoke and Oyeyemi (2011) that only 49.9% - 59% of University students in Nigeria performed recommended physical activities of 30 minutes of moderate-to-vigorous intensity for at least 5 days per week. Moreover, it was discovered that HKE students were more physically active; they had the highest proportion of students per department who performed the recommended physical activities and the lowest proportion that did not perform the recommended physical activity. Similarly, the HKE students expended more MET-mins of vigorous intensity physical activity, had the second MET-mins of moderate intensity physical activity and the lowest MET-mins of light intensity physical activity. The HP students rated next to HKE students in all categories of physical activity, the EMA and CED students were next respectively. This suggests that their involving in practical physical activity courses, which the participants from other departments did not offer, might have influenced high level of physical activity of HKE students. Researchers such as Garber et al (2011), Ojiambo (2013) and Omonu (2015) opined that a dose response relationship exist between the level of physical activity and the

dangers of sedentariness regardless been an athlete or not. This implies that the more people engage in appropriately structured physical activity, the more the benefits they would derive from it and vice versa. To this end, this finding is in line with this submission as their high level of physical activity if sustained could improve their body composition and lower their risk of SeDS. This suggests a need for regular sufficient moderate-to-vigorous physical activity for all students.

The participants engaged in excessive use of ICT for several hours each day, which caused sedentariness. Thus, hypothesis 1 revealed a significant relationship between ICT use and sedentariness. The participants were asked to state how many of the ICT devices they owned/used regularly and state how long they used each device daily. Majority of them reported they owned more than one device and used them for an average of 6 – 8 hours per day. Majority of them also agreed that they sat and or laid down most of the time they used their ICT devices. This finding of is in conformity with Prince et al (2015) who argued that ICT is the greatest environmental correlate of sedentariness among youth especially students of tertiary institutions. It also confirms the finding of Dominic et al (2014) that majority of University of Ilorin community members were sedentary for several hours per day due to excessive ICT use.

In Hypothesis 2, it was found that ICT use had positive correlation with only BMI and %BF when participants with normal and above normal body composition category were considered together. This implies both BMI and %BF could be a model to determine the influence of ICT use on body composition and to assess to risk of SeDS in excessive users of ICT at baseline without specific reference to any obvious symptom of SeDS. However, %BF proved to be the most effective since it revealed a higher possibility of variation due to ones level of ICT use. This finding corroborates to Thyfault et al (2015) who submitted that prolonged sitting/reclining (sedentariness) causes loss of opportunities for effective gaseous exchange as well as cumulative energy expenditure resulting from thousands of intermittent muscular contraction throughout waking hours. This is typical of ICT use, which is responsible for increases in sedentariness among several individuals because most of them often fail to regulate their ICT use. It is also similar to Shehu et al (2010) who opined that weight gain was common to sedentary students.

The findings of hypothesis 3 revealed a positive relationship between ICT use and SeDS. Studies have identified excessive body fat, overweight and obesity as biomarker for SeDS as such; the researchers assessed only participants with above normal category (ANC) of body composition in order to assess the relationship with ICT use. Consequently, it was found that ICT use had positive relationship with all the body composition variables that were tested. This indicated that ICT use is associated with SeDS among the participants since it encourages long hours sitting per day. This finding upheld the position of Dominic et al (2010) individuals with excessive body fat are highly predisposed to risk of arthritis, type 2 diabetes, hypertension, endometrial cancer and premature mortality from all causes. Although hypothesis 2 suggested that only increases in BMI and %BF were significantly influenced by excessive ICT use. This finding suggests that in those who already have the symptoms of SeDS, the level of ICT use could influence all the four body composition variables. One factor that could be responsible for this is high amount of energy surplus due to long hours of sedentariness. Accordingly, Hamilton et al (2007), Graham and Schlesinger (2012) argued, this may have chronic effects on the propensity for the primary risk factors for SeDS such as high glycaemic index, excessive body fat, increase waist and hip circumference, overweight and obesity. Hence, for these categories of people, the assessment of BMI, WHR, WC and %BF could be used to determine their SeDS status.

10. Conclusion

Based on the findings of this study the following conclusions were drawn:

(i) Majority of University of Ilorin sandwich students performed the recommended physical activity. However, a large number of them

did not meet the recommendation for physical activity.

(ii) Excessive ICT use is a major cause of sedentariness among University of Ilorin sandwich students.

(iii) Excessive ICT use was related with high increase in BMI and low increase in %BF of University of Ilorin sandwich students.

(iv) Excessive ICT use among University of Ilorin sandwich students was related with SeDS and BMI, WC, WHR and %BF were all indicators of the risk of SeDS.

11. Recommendations

Based on the findings of this study the following recommendations were made:

(i) Students should habitually perform moderate-to-vigorous intensity physical activity for at least 3 - 5 days per week and should increase their overall daily physical activities.

(ii) University of Ilorin authority should make it mandatory for all students to take at least one practical course in physical activities in each semester throughout their academic programme.

(iii) Students should form the habit of taking 3-5 minutes of physical activity break after every hour of continuous ICT use.

(iv) Students should eat healthy foods that include fruits, vegetables and water and do periodic assessment of body composition to minimize the risk of SeDS.

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