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Physical Activity and Cardiorespiratory Fitness among Healthcare Professionals: a Survey of Physiotherapists in Southwestern Nigeria

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Abstract: Regular and adequate physical activity improves cardiorespiratory fitness and is recommended for health promotion and chronic diseases prevention. Physically active healthcare professionals are more likely to model and encourage physical activity for their patients. There is paucity of information on the physical activity of healthcare professionals in Nigeria. This study was carried out to assess the physical activity level and cardiorespiratory fitness of Physiotherapists in Ibadan, southwestern Nigeria. The study was a cross sectional survey involving all consenting Physiotherapists in Ibadan. Participants' height, weight, waist circumference, hip circumference, waist hip ratio and body mass index were assessed and recorded. International Physical Activity Questionnaire and a validated non-exercise testing protocol were used to assess physical activity and estimated maximal oxygen consumption (VO2max) of the participants respectively. Results of a total of 60 physiotherapists, comprising 32 males (Mean age 34.1± 8.8 years) and 28 females (Mean age 32.7±8.1years) participated in this study were recorded. There was no significant difference in BMI between male and female (males: 22.9±2.6kg/m2; females: 24.4±3.3kg/m2; p=0.54) participants. Eight (13.3%) of participants were highly physically active, while the remaining were either minimally active (75%) or physically inactive (11.7%). Male participants had significantly higher estimated VO2max compared with the female (Males: 42.1±5.9ml/kg/min; females: 35.3±4.6ml/kg/min; p=0.001), a similar observation was made in the physical activity level (Males: 12.0±1.7; females 10.1±1.3 METs; p=0.001). Type of facility, educational level and professional cadre did not have significant effect on physical activity level and cardiorespiratory fitness. It can be concluded that level of physical inactivity among study participants is high. Male participants had significantly higher cardiorespiratory fitness indices and physical activity level compared with the females. There might be need for physiotherapists to take the challenge of physical activity more seriously.

Key words: Physical Activity · Fitness · Nigerian Physiotherapists

INTRODUCTION

Physical inactivity is the fourth leading risk factor for mortality globally [1] and it has been associated with rising incidence of non-communicable diseases across several regions of the world [2]. Global prevalence of physical inactivity among adults is estimated at an average of 17%, ranging from 11 to 24% across different regions of the world [2]. Approximately 21-25% of breast and colon cancers, 27% of diabetes and 30% of ischaemic heart disease burden are attributable to physical inactivity [3].

Regular physical activity is recommended for promotion of health and prevention of several chronic diseases [4, 5]. It has been suggested that one of the ways physical activity imparts beneficial effect on pathogenesis of chronic diseases is by improving cardiorespiratory efficiency [6]. High cardiorespiratory fitness (CRF) is associated with reduced risk of CVD [4] and all-cause mortality [7].

Physiotherapists play an important role in health promotion and disease prevention through the use of exercise in addressing risk factors associated with chronic diseases [8]. The professional demands of the physiotherapy profession require the therapist to engage in activities which requires good amount of strength, flexibility and endurance. As exercise experts, physiotherapists are equipped with adequate knowledge and skill to promote physical activity and fitness [9, 10].

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Physiotherapists are often looked upon by patients and athletes for guidance on how to enhance their physical fitness through the use of appropriate activities [11, 12]. Literature supports the effectiveness of Physiotherapist-supervised exercise training programmes in addressing physical inactivity and low cardiorespiratory fitness. Frantz and Ngambare [12] reported that been physically active, as a physiotherapists, is associated with increased likelihood of advocating and implementing physical activity promoting strategies to their patients. Published data on physical activity level and cardiorespiratory fitness of physiotherapists in Nigeria is scarce. Therefore, this study was aimed at investigating physical activity level and cardiorespiratory fitness profile of physiotherapists in Ibadan, southwestern Nigeria.

MATERIALS AND METHODS

Participants: Participants in this study were full time practicing physiotherapists working in private, government-owned healthcare and tertiary training institutions within Ibadan. Physiotherapists who were pregnant or had acute illnesses were excluded from this study.

Research Design: This study was a cross-sectional study conducted between July and December, 2014.

Sampling Technique: Purposive sampling involving all consenting physiotherapists in Ibadan was utilized.

Venue of Study: This study was conducted in 3 private and 6 government-owned physiotherapy facilities and physiotherapy training institutions within Ibadan.

Procedure for Data Collection: Ethical approval was obtained from the University of Ibadan and University College Hospital (UI/UCH) Health Research Ethics Committee. Also the consent of the Heads of Department of various Physiotherapy centres was obtained. The nature, purpose and procedure of the research were explained to the prospective participants in details by the researcher. Written informed consent was obtained from the prospective participant prior to assessment. The participants were informed of their freedom to refuse to take part in the study and their right to withdraw at any given time they choose. They were also assured of their confidentiality throughout the study.

Participants' demographic data of age, sex, years in practice, level of education and type of facility was obtained and recorded. Measurements of Weight (Wt.), Height (Ht.), Body Mass Index (BMI) and resting Heart Rate (HR) were taken using standard procedures. Physical Activity Level (PAL) was taken using an internationally validated questionnaire for assessment of physical activity level within the last 7 days. The short self-administered form of the questionnaire, which has been validated for populations aged 15-69 years, was used [13]. Maximum oxygen consumption (VO2max) was estimated using a non-exercise protocol developed by Jurca *et al*. [14]. The non-exercise protocol for estimating VO2max had good correlation with Bruce (r = 0.81) and Balke (0.77) protocols. Each participant was instructed to select physical activity score from options ranging from Level 1: Inactive or little activity other than usual daily activities to level 5: Participate in aerobics exercises such as brisk walking, jogging or running at a comfortable pace, or other activities requiring similar levels of exertion for over 3 hours per week. Estimated maximum oxygen consumption was obtained by calculating the MET equivalent using the model: (Gender (0 for women; 1 for men) x 2.77)-(age x 0.10)-(BMI x 0.17)-(HR resting x 0.03) + (Physical activity score x 1) + 18.07. This was then be converted into oxygen uptake (1 MET equivalent is equal 3.5 ml of oxygen uptake per kilogram of body mass per minute).

Data Analysis: Data on age, years of experience, estimated VO2 max were summarized using mean and standard deviation while frequencies and percentages was used to summarize all categorical data including type of facility, gender, level of education, current designation/ cadre, physical activity level. Independent t-test was used to test for mean differences between male and female. ANOVA was used to test for significant difference in mean across types of facility, level of education and cadre. Level of significance was set at p =0.05

RESULTS

A total of 60 Physiotherapists participated in this study, consisting of 32 males and 28 females. Male and female participants were comparable in age (34.1±8.8 and 32.7±8.1years), resting heart rate (74.4±6.7 and 72.6±5.4 b/min) (Table 1) and BMI (22.9±2.6 and 24.4±3.3kg/m2) (Table 2). Male participants had significantly higher estimated maximal oxygen uptake (VO2max) and metabolic equivalents (METs) (p □ 0.05) compared with the female participants. (Table 2)

Type of facility did not have significant effect on physical activity and estimated maximum oxygen consumption of physiotherapists, however, physiotherapists in tertiary training institutions had a

Table 1: Participants' measured variables

	Age (years)		WC (cm)		HC (cm)		HRrest (b/min)	
Variables	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	Pvalue
Sex								
Male (n=32)	34.1±8.8	0.51	83.2±7.8	0.61	96.4±6.8	0.02*	96.4±6.8	0.27
Female (n= 28)	32.7±8.1		84.3±8.6		101.1±9.0		72.6±5.4	
Type of facility								
I (n=9)	31.1±11.7	0.68	84.3±10.1	0.70	99.4±6.5	0.41	75.5±5.8	0.02*
II (n=20)	34.2±8.1		82.5±6.5		100.4±8.8		75.1±5.9	
III (n=31)	33.5±8.0		84.4±8.7		104.2±9.7		71.9±6.2	
Years of Experience								
<5years (n=32)	29.9±4.1	0.001*	83.2±8.0	0.55	102.4±9.5	0.32	74.6±6.1	0.17
5-10years (n=17)	45.8±7.7		86.6±7.1		98.7±6.8		74.3±5.9	
>10 years (n=11)	46.8±8.6		83.9±11.1		97.3±8.1		68.6±4.9	
Level of education								
BSc (n=43)	30.6±5.7	0.001*	83.0±8.2	0.54	100.4±9.6	0.26	73.6±6.1	0.55
MSc (n=11)	36.4±7.2		85.2±5.3		99.2±8.9		74.6±5.9	
PhD (n=6)	49.0±8.5		86.3±11.5		104.3±10.5		71.2±7.7	

Key: WC, waist circumference measured in centimeters (cm); HC, hip circumference measured in centimeters (cm); HRrest, resting heart rate measured in beats per min; *Significant difference at $p < 0.05$; Facility I, Private practice; Facility II, Government owned healthcare facility; Facility III, Tertiary training institution; B.Sc., Bachelor of Science; M.Sc., Master of Science; PhD, Doctor of Philosophy.

Table 2: Participants' derived variables

	BMI(kg/m2)		WHR		METs		VO2max (ml/kg/min)	
Variables	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value
Sex								
Male (n=32)	22.9±2.6	0.54	0.86±0.05	0.03	12.0±1.7	0.001*	42.1±5.9	0.001
Female (n=28)	22.4±3.3		0.83±0.05		10.1±1.3		35.3±4.6	
Type of facility								
I (n=9)	23.3±3.1	0.46	0.86±0.01	0.19	11.1±1.7	0.67	38.9±5.9	0.67
II (n=20)	23.0±2.8		0.83±0.03		10.9±1.5		38.1±5.2	
III (n=31)	24.1±3.1		0.86±0.06		11.3±2.0		39.7±7.1	
Years of Experience								
<5years (n=32)	23.5±3.1	0.71	0.84±0.05	0.36	11.3±1.8	0.34	39.6±6.5	0.34
5-10years (n=17)	23.5±2.3		0.86±0.05		10.4±1.6		36.4±5.5	
>10 years (n=11)	24.6±2.7		0.86±0.02		10.6±1.6		37.3±5.6	
Level of education								
BSc (n=43)	23.6±2.9	0.87	0.84±0.05	0.14	11.4±1.8	0.15	40.6±6.3	0.15
MSc (n=11)	23.3±3.8		0.84±0.04		10.4±1.7		36.5±6.0	
PhD (n=6)	24.1±2.8		0.88±0.06		10.4±1.6		36.3±5.5	

Key: BMI, body mass index measured in kilogram per meters square (kg/m2); WHR, waist hip ratio; METs, metabolic equivalents; VO2max, estimated maximal oxygen uptake measured in millimeters per kilogram per minute (ml/kg/min); Facility I, Private practice; Facility II, Government owned healthcare facility; Facility III, Tertiary training institution; B.Sc., Bachelor of Science; M.Sc., Master of Science; PhD, Doctor of Philosophy; *Significant difference at $p < 0.05$.

significantly lower resting heart rate (71.9±6.2) compared with Physiotherapists in private practice (75.5±5.8) and government owned healthcare facility (75.1±5.9) (Table 1).

Participants were grouped according to years of professional experience. Group I consisted of participants with less than 5 years of professional experience, while group II comprised of those between 5 to 10 years and group III included participants with more than 10 years' experience. There was no significant difference in physical activity level and estimated maximum oxygen consumption across the 3 groups (Table 2). Though participants in group I had higher values of physical activity level (11.3±1.8METs) and estimated VO2 max (39.6±6.5ml/kg/min) compared to those in group II

Table 3: Correlation of selected variables of participants in this study

	Age	Pract.	BMI	WC	WHR	MET	VO2max
Age (yrs)	1	0.949	0.182	0.24	0.262*	-0.336*	-0.336*
Pract.		1	0.153	0.208	0.263*	-0.308*	-0.308*
BMI(kg/m2)			1	0.586*	0.084	-0.372*	-0.375*
WC(cm)				1	0.560*	-0.281*	-0.283*
WHR					1	0.222	0.220
METs						1	1.000*
VO2max							1

Key: Age, age of participants measured in years (yrs); Pract., years of practice; BMI, body mass index measured in kilogram per metres square (kg/m2); WC, waist circumference measured in centimeters (cm); WHR, waist hip ratio; METs, metabolic equivalents; VO2max, estimated maximal oxygen uptake measured in millimeters per kilogram per minute (ml/kg/min); *, Significant correlation at 0.05 level (2 tailed).

(physical activity level=10.4±1.6; VO2max=36.4±5.5 ml/kg/min) and group III (physical activity level=10.6±1.6; VO2max=37.3±5.6), it was not statistically significant (Table 2).

Participants were also grouped according to their highest educational level. There was significant difference in age (30.6±5.7; 36.4±7.2; 49.0±8.5) across the three levels of education. The mean resting heart rate of participants with Master's degree was higher than those with B.Sc. or PhD but not statistically significant (Table 1). Physiotherapists with Bachelor's degree had higher estimated VO2max (40±6.3ml/kg/min) than those with Masters and Doctoral degree, though it was also not statistically significant (Table 2).

Pearson product correlation was used to test the relationship between selected parameters and physical activity and maximum oxygen consumption (Table 3). A significant negative correlation was also noted between metabolic equivalents and each of age (r=-0.336), years of practice (r=-0.308), body mass index (r=-0.372) and WC (r=-0.281). Similarly, significant negative correlation was also observed between estimated maximal oxygen uptake and each of age (r=-0.336), years of practice (r=-0.308), body mass index (r=-0.375) and waist circumference (r=-0.283) ($p < 0.05$)

DISCUSSION

Data from this study suggested that most physiotherapists practicing in Ibadan, southwestern Nigeria are either minimally active or physically inactive. According to the scoring and classification of physical activity by IPAQ, only 13.3% of the participants of this study were highly physically active. Estimated maximum oxygen consumption of physiotherapists in this study (Males: 42.1±5.9ml/kg/min; females: 35.3±4.6ml/kg/min) is higher than the findings of Akinremi *et al*. [15] who reported estimated VO2max of 28.5±4.7ml/kg/min (Male) and 25.2±6.3ml/kg/min (Female) from a sedentary adult population within the same locality.

Observation from this study also showed that physical activity and cardiorespiratory fitness is influenced by gender. Male participants had significantly higher PA scores and estimated VO2max compared with the females though their BMI were comparable. Since high physical activity level is positively associated with high VO2max score, it is not surprising therefore that the male participants who had higher physical activity level also had significantly higher VO2max. A similar finding was observed by Byrd-William *et al.* [16] who reported gender differences in physical activity and cardiorespiratory fitness among Hispanic youth.

No significant difference was observed in physical activity and cardiorespiratory fitness of participants when compared according to type of facility and professional cadre. Though participants in tertiary training institutions (III) had higher values of estimated VO2max and METs than those in the private practice and government owned facilities, it was not statistically significant. This suggested that the type of facility Physiotherapists work does not influence their physical activity level or cardiorespiratory fitness. This may be due to the fact job description of a physiotherapist is similar irrespective of type of facility.

Grouped according to academic qualification, participants with doctoral degree were significantly older than those with B.Sc. and M.Sc. It is expected that with increased age, there should be decreased cardiorespiratory fitness, however, in this study, despite the significant difference in age across educational level; there was no corresponding difference in estimated VO2max. This is contrary to the submission of Steven *et al*. [17] which argued that advancing age is related to decline in VO2max. They proposed that as age

increases, there is decrease in cardiorespiratory fitness which may be explained by decreasing physical activity. The similarities in physical activity level and cardiorespiratory fitness across the 3 educational categories despite the significant difference in age might be due to the fact that Physiotherapists are knowledgeable about the health benefits of physical activity.

Increase in BMI was associated with decrease physical activity among study participants. This observation is similar to the findings of Laxmikant *et al*. [18] who assessed the physical activity by in bank employees and found that there is strong negative association between their BMI and MET score. We also noted a significant negative association between VO2 max and age. Astrand *et al*. [19] suggested that maximum oxygen uptake increases with age up to 20 years, after which there is a gradual decline in maximum oxygen uptake. The decline in cardiorespiratory fitness with increasing age might be due to decrease in muscle mass, which plays a vital role in oxygen uptake.

The findings of this study should be interpreted with cautions as the assessment of the participants' activity level using a recall instrument is highly dependent on participant's ability to recall, which might affect self-reported physical activity level. Though the non-exercise testing protocol for estimating maximum oxygen consumption is well validated and reliable, it may overestimate VO2max.

Met Equivalent Is Estimated Using the Model: (Gender (0 for women; 1 for men) x 2.77)-(age x 0.10)-(BMI x 0.17)-(HR resting x 0.03) + (Physical activity score x 1) + 18.07. This can then be converted into oxygen uptake (1 MET equivalent is equal 3.5 ml of oxygen uptake per kilogram of body mass per minute). This method avoids the burden of exercise testing, while providing a reasonably accurate estimation of CRF.14

Service delivery in physiotherapy profession requires good amount of muscle strength and cardiorespiratory endurance. Health related fitness is required to carry out the routine job activities of a physiotherapist. Physiotherapists are trained as professionals who utilize exercise for treatment, disease prevention and health promotion; hence they are ideally positioned to promote physical activity to achieve these goals. Physiotherapists who are physically fit are more confident to prescribe and encourage their patients to be physically active.

CONCLUSION

Gender had significant effect on cardiorespiratory fitness (Estimated VO2max) and physical activity level. Type of facility, level of education and professional cadre had no significant effect on physical activity level and cardiorespiratory fitness. Physiotherapists are encouraged to be more physically active irrespective of their cadre and educational level.

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