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Original Article

Internal Medicine Section

Physical Activity and Sedentary Lifestyle among Diabetes Healthcare Providers in Nigeria: Time to Examine the Examiners

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ABSTRACT

Introduction: Diabetes Healthcare Providers (DHPs) are notable advocates of increased Physical Activity (PA) as a veritable means of preventing type 2 diabetes mellitus and related non-communicable diseases. However, the extent to which the DHPs themselves comply with this important lifestyle habit is not known.

Aim: To evaluate PA and sedentary living among DHPs in Nigeria and identify some determinants of PA in this population.

Materials and Methods: In this cross-sectional study, PA was assessed using the short form of the International Physical Activity Questionnaire (IPAQ-SF). Besides socio-demographic and anthropometric indices, participants were asked about frequency and duration of engagements in vigorous PA, moderate PA, walking and average sitting time, in the past 7 days. Data were analysed using Chi-square, t-test, Spearman's test of correlation and logistic regression statistics on SPSS version 23.

Results: One hundred and eight subjects (63% males), with a mean age of 42.1±7.7 years, participated in the study. Although 86% of the participants were adjudged physically active, the intensity of PA was low in 52.8% and 74.1% did not meet the World Health Organisation recommended target for adequate PA. A significant negative correlation was observed between intensity of PA and Body Mass Index (BMI) while sitting time positively correlated with BMI. BMI ≥25 kg/m^2 and higher professional cadre were significant independent predictors of low PA.

Conclusion: Nearly three-quarter of DHPs in Nigeria do not engage in sufficient PA. This observation calls to question their ascribed status as role models of healthy lifestyles and may portend increased health risks among this important group of healthcare workforce. There is a significant inverse relationship between PA and BMI as well as professional cadre.

Keywords: Moderate exercise, Non-communicable disease, Sitting time, Vigorous exercise, Walking

INTRODUCTION

The role of PA as an important determinant of health and diseases is well documented in literature [1-4]. Lack of sufficient PA has been linked to many Non-communicable Diseases (NCDs) including obesity [1], Type 2 Diabetes Mellitus (T2DM) [2], Cardiovascular Diseases (CVDs) [3], depression, and some cancers [4]. In fact, in a recent meta-analysis, PA was only second to hypertension as the strongest predictor of heart disease [5], and CVDs are the leading cause of mortality worldwide. Lack of sufficient PA has also been shown to be a significant predictor of mortality in healthy adults independent of other cardiovascular risk factors [6]. Therefore, the importance of PA as an indispensable determinant of health cannot be over-emphasised.

Although physical inactivity as a major cardiometabolic risk factor is well established, the amount of PA that constitutes "sufficient PA" is less clear. However, a dose-response relationship between PA and cardiovascular health has been demonstrated [5]. The World Health Organisation (WHO) defines adequate PA as having at least 150 minutes of moderate intensity PA or 75 minutes of vigorous intensity PA per week [7]. Similarly, according to the WHO, an individual should meet up to 600 Metabolic Equivalents of Tasks (MET) (minutes per week) of PA to be adjudged physically active. One MET represents the energy expended while sitting quietly at rest.

Globally, Healthcare Professionals (HCPs) are in the frontline of advocacy for increased PA as an integral part of healthy lifestyles necessary for the prevention and management of NCDs. However, evidences have shown that the PA habits of HCPs are an important determinant of their effectiveness in such advocacy with physically inactive HCPs being less likely to provide counseling on PA [8,9]. Available evidences indicate that HCPs in Nigeria are less physically active than the general population [10,11]. Although this observation is worrisome, these researches did not provide distinction between PA habits of general HCPs and those who specialise in the care of NCDs for which PA has been shown to have a closer link. Diabetes Healthcare Providers (DHPs) form a significant pool of the latter group of HCPs and are among the major vanguards and largest prescribers of increased PA.

Like their counterparts globally, the Nigerian DHPs are expected to be role models of healthy lifestyles including PA so as to serve as effective promoters of same. However, the extent to which this group of HCPs lives up to this expectation remains merely speculative. This formed the basis for this study.

MATERIALS AND METHODS

This was a cross-sectional survey among diabetes care physicians (endocrinology fellows and trainees) which was conducted from 13th-16th September 2016 during the annual conference of Endocrinology and Metabolism Society of Nigeria (EMSON) held in Calabar, Cross-River state. EMSON is a professional body of all qualified and trainee endocrinologists as well as other HCPs allied to endocrinology specialty including pharmacists, nurses, dieticians/nutritionists, diabetes educators and podiatrists in Nigeria. It is the largest of such professional bodies in Sub-Saharan Africa and comprises about 200 registered members, about 80% of whom are physicians. The study questionnaires were distributed to all the physicians participating in the conference after obtaining verbal consent and the Research and Ethics Committee of Enugu State University Teaching Hospital approved the protocol.

Through a self-administered customised pro-forma, socio demographic information such as age, gender, professional cadre, type of practice facility and duration of practice in the specialty of

diabetology were documented. Anthropometric measurements of weight in kilograms and height in meters were conducted by standardised methods, and BMI calculated as a ratio of weight to the square of height in kg/m^2.

Physical activity was assessed using the IPAQ-SF [12]. It is a cross-culturally validated instrument that evaluates PA in three domains namely: Vigorous Physical Activity (VPA), Moderate Physical Activity (MPA) and Walking Physical Activity (WPA).

VPA consists of those activities that require extra physical efforts and make one breathe much harder than normal e.g. running, jogging, cycling at a fast pace, swimming, etc.

MPAs are those that require moderate physical efforts and make one breathe somewhat harder than normal e.g., lifting, climbing stairs, etc.

Each participant provided information regarding the frequency (days) and duration (minutes/day) of engagement in each of these domains in the past 7 days. Only activities that lasted at least 10 minutes were considered. The amount of PA in each domain was computed as a continuous variable (in MET-min/week) by multiplying the frequency and duration of activity in each domain by the corresponding METs conventionally assigned to such activity which are 3.3 METs, 4 METS and 8 METs for WPA, MPA and VPA respectively [12]. The TPA for each individual was then derived as a sum total of the PA in each of the three domains.

Participants were categorised as either physically active or inactive depending on whether they attained a minimum TPA of 600 MET-min/week [7].

Physical activity was further categorised as either adequate or inadequate based on the WHO recommended level of at least 150 minutes per week of moderate to vigorous intensity PA [7].

The intensity of PA was also categorised as low, moderate or high according to the IPAQ scoring protocol as follows [12]:

Low PA - no activity or some PA that were insufficient to be classified as moderate or high; Moderate PA-any of the following three criteria: (a) 3 or more days of VPA lasting at least 20 min/day; (b) 5 or more days of MPA or walking lasting at least 30 min/day; (c) 5 or more days of any combination of walking, MPA or VPA cumulatively achieving a minimum of 600 MET-min per week;

High PA - either of the following two criteria: (a) 3 or more days of VPA accumulating at least 1500 MET-min per week; or (b) 7 days of any combination of walking, MPA or VPA accumulating a minimum of 3000 MET-min per week.

The sedentary habit of each participant was assessed by self-reported sitting time (in hours) per day, in the past 7 days. The IPAQ instrument has been cross-culturally validated and has been used by other authors for assessment of PA both in the general population and among HCPs in Nigeria [10,13].

Data were analysed with SPSS version 23. Descriptive statistics such as frequencies and percentages or means and standard deviations were employed for categorical and continuous variables respectively. Group comparisons were done with Chi-square and independent t-test as appropriate. The relationship between continuous variables and TPA as well as sitting time were tested with Spearman's test of correlation while multivariate logistic regression was employed to determine predictors of low physical activity after dichotomizing the population into two physical activity categories: low versus moderate-to-high. Statistical significance was established at $p<0.05$.

RESULTS

A total of 108 subjects (63% males) out of a targeted population of 142 participants completed the study giving a response rate of 76.1%. The mean (±SD) age and mean duration of practice in diabetology were respectively 42.1±7.7 years and 8.2±5.3 years. The mean BMI was 27.2±2.9 kg/m2 and 18.5% of the respondents were obese. [Table/Fig-1] shows the demographic characteristics of the respondents.

Variable	Mean±SD	Frequency	Percentage
Age (years)	42.1±7.7		
<45		71	65.7
≥45		37	34.3
Gender			
Males		68	63.0
Females		40	37.0
Professional cadre			
Fellows		66	61.1
Trainees		42	38.9
Setting of practice			
Tertiary hospital		96	88.9
Secondary health facility		12	11.1
Primary health facility		0	0
Duration of practice (years)	8.5±5.4		
≤10		79	73.1
11-20		25	23.1
>20		4	3.8

[Table/Fig-1]: Socio-demographic characteristics of the respondents.

The physical activity and sedentary behaviour of the respondents are shown in [Table/Fig-2]. Although, 86.1% of the respondents were adjudged physically active based on meeting at least 600 METs-min/week, the intensity of PA was low in 52.8% of the participants and only 25.9% of the participants met the WHO recommended adequate PA level of at least 150 minutes per week of moderate intensity PA or equivalent. The mean TPA was 1313.4±921.5 MET-min/week and the mean sitting time was 8.3±1.4 hours/day.

Variable	Mean±SD	Frequency	Percent
VPA (MET-min/week)	326.3±540.9		
Participation		56	51.9
Non participation		52	48.1
MPA (MET-min/week)	289.4±625.3		
Participation		70	64.8
Non participation		38	35.2
Walking (MET-min/week)	697.6±655.1		
Participation		108	100
Non participation		0	0
PA category			
Physically active		93	86.1
Physically inactive		15	13.9
PA intensity			
High		16	14.8
Moderate		35	32.4
Low		57	52.8
PA adequacy			
Adequate		28	25.9
Inadequate		80	74.1

[Table/Fig-2]: Physical activity and sedentary habits of the diabetes healthcare providers.
VPA: Vigorous physical activity; MET: Metabolic equivalents; MPA: Moderate physical activity; WHO: World health organisation

Gender differences in PA were observed among the participants [Table/Fig-3]. Males were observed to significantly engage in more VPA compared to females (P 0.040). However, females engaged

more in MPA (P 0.027), walking (P 0.005) and had a higher overall TPA (P 0.023) than the males. There was no difference in sitting time between the two sub-groups.

Variable	Gender		T	p-value
	Male (n=68)	Female (n=40)		
Age (years)	41.2±7.9	43.7±7.1	-1.64	0.103
BMI (kg/m^2)	27.0±2.6	27.5±3.3	-0.78	0.436
Duration of practice (years)	7.8±5.4	8.9±5.2	-0.95	0.342
VPA (MET-min/week)	408.2±636.4	187.0±274.7	2.10	0.040
MPA (MET-min/week)	187.9±152.0	462.0±992.2	-2.24	0.027
Walking (MET-min/week)	563.0±425.7	926.5±883.7	-2.88	0.005
TPA (MET-min/week)	1159.2±753.6	1575.5±1114.5	-2.31	0.023
Sitting Time (hours/day)	8.2±1.2	8.3±1.7	0.30	0.765

[Table/Fig-3]: Gender differences in physical activity and sitting time among the diabetes healthcare providers.
BMI: Body mass index; VPA: Vigorous physical activity; MET:Metabolic equivalents; MPA: Moderate physical activity; TPA: Total physical activity

The relationships between PA, sitting time and some variables are shown in [Table/Fig-4]. A significant negative correlation was observed between TPA and BMI (r=-0.44; p <0.001). Age showed no significant correlation with both TPA and sitting time.

Dependent variables	Independent variables	R	R2	p-value
TPA (MET-min/week)	Age (years)	-0.12	0.044	0.228
	BMI (kg/m^2)	-0.44	0.006	<0.001
	Duration of practice (years)	-0.08	0.050	0.412
Sitting Time (hours/day)	Age (years)	0.12	0.0009	0.210
	BMI (kg/m^2)	-0.03	0.065	0.749
	Duration of practice (years)	0.001	0.020	0.993

[Table/Fig-4]: Relationship between total physical activity, sitting time and some participants' characteristics.
BMI: Body mass index; VPA: Vigorous physical activity; MET: Metabolic equivalents; MPA=Moderate physical activity; TPA=Total physical activity

On multivariate logistic regression, BMI and professional cadre were significant predictors of low PA. Subjects with BMI ≥25 kg/m^2 (OR 6.10, P 0.002) were more likely to have low PA. Lower professional cadres (Trainees) were less likely to have low PA compared to Fellows [Table/Fig-5].

Variable	O.R.	95% CI	p-value
Age (>45 years)	0.85	0.26-2.82	0.787
Gender (male)	1.02	0.40-2.57	0.975
BMI (≥25 kg/m^2)	6.10	1.94-19.16	0.002
Professional cadre (Trainees)	0.05	0.01-0.22	<0.001
Duration of practice (>10 years)	3.19	0.65-15.70	0.154

[Table/Fig-5]: Independent predictors of low physical activity among the diabetes healthcare providers.
BMI: Body mass index

DISCUSSION

In this survey we evaluated the PA and sedentary habits of 108 diabetologists in Nigeria and the socio-demographic determinants of PA. Our findings reveal a huge discrepancy between what the DHPs preach and what they practice. We observed a surprisingly low level of PA among the DHPs, with only about a quarter of the respondents meeting the WHO recommended level of PA adequate for maintenance of good health. This finding portends grave consequences to the Nigerian healthcare sector in two ways. In the first place, the low PA habits among the diabetologists put them at high risk of NCDs and increased mortality as has been demonstrated by several studies [1-6]. Therefore the Nigerian healthcare sector faces a huge threat of unhealthy workforce with attendant negative consequences on general population health. Secondly, the low PA habits of the DHPs could constitute a big barrier to counseling of patients and the general populace about PA as have been previously demonstrated [8,9]. This development carries great potentials for adverse public health consequences.

Globally, no study has evaluated PA specifically among DHPs. However, our findings are consistent with those of several studies conducted among general HCPs which demonstrated low levels of PA among the health workers [10,14-16]. In Nigeria, 79% of HCPs were reported to have low PA irrespective of professional cadre [10]. Similarly, a Polish study on 764 HCPs found that only 10.9% of men and 13.5% of women were sufficiently physically active, with physicians being less physically active than other HCPs [14]. In Egypt, 84% of physicians were reportedly sedentary [15] while only 29% of Bahraini physicians engaged in leisure time physical activity [16]. Ours and these other studies provide credible evidence that PA is declining globally among HCPs. In contrast, some studies have documented a higher prevalence of PA among HCPs, which was reportedly 65.2% in Saudi Arabia [17], 67.5% in Malaysia [18], 92% among Estonian family physicians [19], and 84.8% among attending physicians in the USA [20]. These divergent findings may be accounted for by differences in the operational definitions of outcome. For instance while we and other authors [10,14] relied on the standard WHO recommended PA sufficient for cardiometabolic benefits, others [17-20] used less stringent measures to classify their study subjects into physically active or inactive.

Although PA is declining significantly in the general population, it appears that the trend is worse among HCPs. For instance, the prevalence of inadequate PA observed in this study (74.1%) and a previous Nigerian study (79%) [10] were much higher than in the general Nigerian population which was reportedly 29.8% in the South-West [21], 31.4% in the North-East [22] and only 6.4% among University students in South-Eastern Nigeria [23], suggesting that the Nigerian HCPs are surprisingly less physically active than the general population. Previous authors have blamed this on the sedentary nature of healthcare jobs [10]. However, studies in some developed countries appear not to sustain this argument. In both Europe and the United States of America for instance, HCPs were reportedly more physically active than the general population [19,20]. This raises the probability that unhealthy work schedules characterised by long working hours typical of most African countries with critical healthcare manpower shortages, rather than healthcare job per se, may be largely responsible for this trend. For instance, while patient-to-endocrinologist ratio is less than 30,000:1 in the USA [24], it is estimated to be about 600,000:1 in Nigeria, and the resultant high workload may hamper HCPs' participation in sufficient PA. This assertion is supported by studies in some other developing countries where lack of time was cited as the commonest reason for HCPs not engaging in sufficient PA [16,25].

Age, gender and duration of professional practice did not predict the intensity of PA in our study. Gender neutrality on PA intensity had been previously reported, both among HCPs [10,14,17,18] and in the general population [22,26]. An 18-year follow-up study showed that even though more boys than girls participated in sports at the age of 16, there was no significant difference at the age of 34 [26]. However, these observations appear to further deepen the controversies in this area as many other studies have consistently reported a higher level of PA in men compared to women, with the frequency and intensity of PA declining with advancing age [27-30]. We suspect that differences in socio-demographic characteristics of the populations studied may be partly responsible for these discrepancies. Gender differences in the type of PA engaged by the respondents were however observed in this study. While males engaged more in vigorous PA, females participated more

in moderate PA and walking, with no gender difference in sitting time. This trend may be explained from cultural and behavioral perspectives which encourage more male participation in out-door activities including sports while females tend to engage more in shopping and domestic chores.

We observed a significant negative correlation between total PA and BMI. Furthermore, subjects who were overweight or obese were six times more likely to have low PA compared to those with normal BMI. An inverse relationship between BMI and PA has been consistently reported in the general population [1,13,28]. In the Coronary Artery Risk Development in Young Adults (CARDIA), a 20-year prospective longitudinal study, maintaining high level of PA was associated with smaller increases in BMI and Waist Circumference (WC) in both sexes [1]. In one Nigerian study [13], both BMI and other components of the metabolic syndrome including WC and blood pressures demonstrated significant inverse relationship with health-enhancing moderate-to-vigorous intensity PA. Among HCPs, it had been demonstrated that subjects with BMI ≥25 kg/m^2 were two to three times as likely to engage in insufficient PA [10,14]. A bidirectional relationship is known to exist between obesity and PA such that obesity is both a consequence of and a strong risk factor for low PA. It is noteworthy however that a few studies have reported no significant association between PA and BMI among HCPs [18,19]. The reason for these divergent findings is not readily obvious.

LIMITATION

First, its cross-sectional nature did not permit causality relationships. Secondly, the use of self-reporting may be prone to errors arising from social desirability bias and inaccurate recall of the frequency and duration of physical activities. Thirdly, the IPAQ instrument which was used for PA assessment in this study relies only on activities undertaken in the previous seven days and this may not be a true reflection of the individual's day-to-day PA habits.

CONCLUSION

Findings from this study revealed that diabetes care physicians in Nigeria do not engage in sufficient physical activity. This uncomfortable reality may not only jeopardise current efforts at NCD prevention and care in Nigeria since the DHPs are regarded as role models of healthy lifestyles, but this important group of healthcare professionals may be sitting on a cardiovascular time bomb if this trend is not interrupted.

Authors' contributions: All authors have made useful contributions to qualify for authorship as follows: EU conceptualised the study and contributed to study design, literature search and manuscript writing. BN contributed in data acquisition, data analysis and interpretation and critical revision of the paper for important intellectual content. DS contributed in data acquisition and critical revision of the manuscript for important intellectual content. MN contributed in data interpretation and manuscript writing. JO contributed in data interpretation and critical revision of the paper. MA critically reviewed the manuscript for important intellectual content. All authors read and approved the final version of the paper.

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