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## ORIGINAL ARTICLE

### Physical activity and physical activity education: preferences of patients with type 2 diabetes mellitus in Nigeria.

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#### Abstract

*Background:* People with type 2 diabetes do not seem to be adequately active. This may be because the prescribed physical activities are not in agreement with the patients' preferences. This study explored the physical activity preferences of a group of patients with type 2 diabetes in Nigeria. *Methodology:* A total of 259 patients with type 2 diabetes (174 males, 85 females; aged 33-76 yr), who were not medically restricted from engaging in physical activities were consecutively recruited into the study with each completing a questionnaire designed to assess physical activity preferences in the areas of performance and education. *Results:* Walking was the most preferred physical activity for 220 (84.9%) of the participants, while swimming was only considered by 2 (0.8%) persons as a 3<sup>rd</sup> choice. The majority of them (83%) would prefer their physical activity sessions at home, 77.6% would prefer unsupervised activity sessions, and 70.3% would prefer physical activity education directly from healthcare providers. The preference for physical activity sessions at home was significantly linked with older age, being employed, having lesser income, educated, married, living in an urban settlement and with diagnosis of 10 years or more ( $p < 0.01$ ). *Conclusion:* Most of the patients preferred walking more than any other activity, yet would want to undertake the activity within their homes. They also yearned for physical activity education, but directly from healthcare providers and not through print or electronic media. Expanded physical activity orientation for the patients is needed in order to enhance informed acceptability of other beneficial physical activity options. **Health & Fitness Journal of Canada 2014;7(4):16-32.**

*Keywords:* Physical activity, Health promotion, Preferences, Chronic disorders

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#### Introduction

Physical activity and exercise are integral components of the prescription for self-management plan for patients with diabetes or anyone at risk of developing type 2 diabetes mellitus (T2DM) (Mullooly and Kemmis, 2005). In view of the plethora of evidence on the benefits of physical activity in diabetes care (Walker et al, 1999; Gregg et al, 2003; Colberg et al, 2010; Zethelius et al 2014), numerous expert opinion-based guidelines (Pate et al, 1995; Sigal et al, 2004; Sigal et al, 2006; Haskell et al, 2007; Colberg et al, 2010; American Diabetes Association [ADA], 2013) have been put forward as physical activity recommendations for patients with the disorder. As a result of this, healthcare professionals usually advise most patients with or at high risk of developing diabetes to exercise, suggesting recognition of its importance in the disease management (Morrato et al, 2006). As laudable as these guidelines are, a major issue is their generic nature, catering simultaneously for the millions of people with T2DM, without taking into consideration the multiplicity of individual patient preferences.

To the best of the authors' knowledge, there is no evidence on the physical activity preferences of patients

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with T2DM in Nigeria or any other developing nation in the sub-Saharan Africa. This apparent lack of audit of patients' preferences may make adherence to physical activity difficult, because experts are prescribing different types of physical activities without special consideration for the peculiar preferences of the patients. It has been observed in previous studies (Morrato et al, 2006; Colberg et al, 2010), that there was no overall increase in physical activity in patients who reported being advised to exercise and it was described as an underutilized therapy (Albright et al, 2000). Another reason for concern is that while more patients with diabetes are being advised to exercise, their exercise rates remain low and are even lower than for the general population (Morrato et al, 2005). In a review of published studies on improving the rates of physical activity participation, it was reported that everyone, including healthcare and public health professionals, schools, businesses, community groups, and policy makers, has a part to play in improving the rates of participation in physical activity (Albright, 2005). It is even more important that patients be allowed to play major roles when it comes to matters relating to their care. Practitioners have therefore been encouraged to use factors such as preferences and enjoyment to determine specifically how an individual would meet recommended physical activity participation (Colberg et al, 2010). In view of this, the present study sought to investigate the physical activity preferences of a group of patients with T2DM in Nigeria.

### **Methodology**

#### **Study setting**

With an estimated population of about 178 million (World Bank, 2015), Nigeria is the most populous country in Africa. It is made up of 36 states divided across 6 geopolitical zones (Nigeria.gov, 2015), of which the Southwest, the region where this study was conducted is one. Nigeria is currently classified as a lower middle-income country (World Bank, 2015). Nigeria's literacy rate is estimated at 61% and the country has a large number of out-of-school children and young adults with limited literacy and numeracy skills who have little hope of ever joining the formal workforce (Nigeria.usembassy.gov, 2012). Internet penetration in Nigeria, especially in the rural areas, is still very low with factors such as high cost of bandwidth, low computer literacy level as well as epileptic internet services constituting some of the major barriers preventing users from accessing education through open and distance learning using the internet (Osang, 2012). In Oyo State, where this study was conducted, total access to computers and Internet facilities was 4.3% (Osang, 2012; National Bureau of Statistics, 2011). According to Ukwandu and Nwajiuba (2011), Nigeria seems to be dealing with two divides: the rural-urban divide of economic and other opportunity deprivations, and the digital divide of access to information and communication technologies and economic opportunities. In terms of human health resources, Nigeria has one of the largest stocks of human resources for health in Africa but, like the other countries experiencing human resource for health crises, its densities of nurses, midwives and doctors are still too low to effectively deliver essential health

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services (1.95 per 1,000) (WHO, 2015). The health workforce is concentrated in urban tertiary health care services delivery in the southern part of the country (WHO, 2015).

### Participants

Participants for the current study (conducted from September 2013 to March 2014) were consecutive patients presenting at the Diabetes Clinics of the University College Hospital and the Ring Road State Hospital, both in Ibadan, Southwest Nigeria. The idea of determining a sample size for this study was dropped because the total number of patients who were presenting at both clinics during the period of the study was less than 500. It was thus decided that all willing patients who also met the inclusion criteria, be included in the study. The criteria included being diagnosed with T2DM for at least 6 months, and not having any complications that may affect participation in physical activity such as amputation, blindness and severe diabetic foot ulceration. Patients restrained from physical activity on medical grounds as well as type 1 diabetic patients were excluded from the study.

### Data collection instrument

A self-developed questionnaire was used to collect data from the participants. The sets of questions that were captured in the questionnaire were based on the possible physical activity categories available in the Nigerian context. The questionnaire was evaluated for content validity by physiotherapists who are involved in physical activity for health promotion. The questionnaire was self-administered but necessary assistance

was provided for participants who needed assistance.

The questionnaire solicited responses in two sections: The first section comprised items on physical activity-related preferences including type of physical activity, when to start physical activity, supervision, variation of physical activity, structure of physical activity, nature of physical activity, venue of physical activity, time of the day for physical activity, and the desire to have physical activity partner(s). The second part solicited responses on issues related to receiving education on physical activity, such as the desire to receive physical activity education, and the preferred source of the education. Participants were asked to indicate their most preferred physical activity, indicating which one they rated first, second and third. The same approach was also applied for the questions on preferred venue for physical activity and source of physical activity education. Other questions germane to this study included age, sex, the highest level of education obtained, type of residential settlement and other socio-demographic details. The questionnaires were administered in English or Yoruba language because Yoruba-speaking people predominantly occupy the study area. The study protocol was reviewed and approved by the joint Research Ethics Committee of the University of Ibadan and University College Hospital, Ibadan (ID: UI/EC/13/0180).

### Statistical Analyses

All analyses were conducted using the IBM SPSS (version 20; SPSS Inc, Chicago, IL, U.S.A.). Descriptive statistics of frequencies and percentages were used to present all categorical data including

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the socio-demographic and physical activity variables. The Chi square test was used to determine associations between socio-demographic characteristics and each of the preferences for venue of physical activity and source of physical activity education. For the purpose of Chi square analysis, only the most preferred options (rated as first) were considered. In addition, preferences for venue of physical activity were dichotomized into home activities (physical activities that will be done within the home) versus other options (physical activities in places other than their homes e.g. commercial fitness centres, clinics/diabetes care centres and free public spaces). The preferences for source of physical activity education were equally dichotomized into health care providers versus options other than healthcare providers (peers, electronic media, print media, etc.). Level of significance was taken as  $p < .05$ .

### Results

A total of 259 patients with T2DM participated in this study made up of more female (174; 67.2%) than male participants (Table 1). More than half (54.4%) of the participants were 60 yr and over, with nearly half of them (42.9%) diagnosed less than 10 years before the study period. Other descriptive details of the participants are presented in Table 1. The participants were asked to rate a list of physical activity options as their 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> preferences. Walking was rated by 220 (84.9%) of the participants as 1<sup>st</sup> choice while swimming was not rated by any participant as 1<sup>st</sup> or 2<sup>nd</sup>, but was selected by only 2 (0.8%) participants who rated it as their 3<sup>rd</sup> choice activity (Table 2). It was discovered that 215 (83%) of the participants would prefer to have their

physical activities within their homes, as against 22 (8.5%) and 7 (2.7%) who would prefer commercial fitness centres and clinics/diabetes care centres respectively. However, more than half of the participants (66.8%) indicated that they would prefer to receive physical activity education at the clinics/diabetes centres. It appears that the majority of participants would like to have some degree of independence with their physical activity programmes as up to 201 (77.6%) of them preferred their physical activity sessions to be unsupervised (Table 3). In addition, 151 (58.3%) of them indicated that they would not require any partner while performing their physical activities. Furthermore, 79.9% of the participants demonstrated a preference for flexible physical activity sessions.

All the socio-demographic characteristics of the participants except sex ( $p = 0.58$ ) were significantly associated ( $p < 0.05$ ) with preference for venue of physical activity (Table 4). It was observed that a significantly higher proportion of participants aged 50 years and over preferred to have their physical activity programmes at home compared to those who were younger ( $\chi^2 = 18.06$ ;  $p = 0.0001$ ). Similarly, a significantly higher proportion of participants who were employed preferred to have their physical activities at home compared to those who were not engaged in any form of employment ( $\chi^2 = 3.93$ ;  $p = 0.04$ ).

Table 5 shows the association between socio-demographic characteristics and preferred source of physical activity education. All the characteristics except settlement type were significantly ( $p < 0.05$ ) associated with preferred source of physical activity education. While physical activity

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**Table 1: Descriptive statistics of the participants.**

Variables	Frequency (%)
<b>Sex</b>	
Female	174 (67.2)
Male	85 (32.8)
<b>Age (yr)</b>	
< 40	9 (3.5)
40-49	27 (10.4)
50-59	82 (31.7)
≥ 60	141 (54.4)
<b>Occupational status</b>	
Employed	169 (65.3)
Retired	74 (28.6)
Unemployed	16 (6.2)
<b>*Earned monthly income (for the employed n = 169)</b>	
< 100,000 NGN	122 (72.2)
≥ 100,000 NGN	47 (27.8)
<b>Level of education</b>	
No formal education	46 (17.8)
Primary	60 (23.2)
Secondary	72 (27.8)
Tertiary	81 (31.3)
<b>Ethnicity</b>	
Yoruba	248 (95.8)
Igbo	11 (4.2)
<b>Marital status</b>	
Single	4 (1.5)
Married	211 (81.5)
Divorced	7 (2.7)
Widowed	37 (14.3)
<b>Religion</b>	
Islam	96 (37.1)
Christianity	163 (62.9)
<b>Type of settlement</b>	
Urban	247 (95.4)
Rural	12 (4.6)
<b>Duration of diagnosis (years)</b>	
<10	111 (42.9)
10-19	99 (38.2)
20-29	40 (15.4)
≥ 30	9 (3.5)
<b>* 100,000 NGN (Nigerian naira) = 550 USD (United States dollars).</b>	

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**Table 2: Rating of preferences for physical activity performance and education.**

	<b>1<sup>st</sup> choice n (%)</b>	<b>2<sup>nd</sup> choice n (%)</b>	<b>3<sup>rd</sup> choice n (%)</b>
<b>A: PHYSICAL ACTIVITY PERFORMANCE</b>			
<b>Preference for type of physical activity</b>			
Walking	220 (84.9)	7 (2.7)	4 (1.5)
Swimming	Nil	Nil	2 (0.8)
Jogging	12 (4.6)	33 (12.7)	15 (5.8)
Gymnasium activities	4 (1.5)	16 (6.2)	13 (5.0)
Street cycling	2 (0.8)	2 (0.8)	6 (2.3)
Home exercise	4 (1.5)	71 (27.4)	66 (25.5)
House chores	6 (2.3)	55 (21.2)	56 (21.6)
Dancing	4 (1.5)	48 (18.5)	79 (30.5)
Other outdoor sports	7 (2.7)	14 (5.4)	9 (3.5)
<b>Preference for venue of physical activity</b>			
Home	215 (83.0)	28 (10.8)	8 (3.1)
Commercial fitness centres	22 (8.5)	11 (4.2)	8 (3.1)
Clinic/diabetes care centres	7 (2.7)	24 (9.3)	33 (12.7)
Open public spaces	15 (5.8)	133 (51.4)	10 (3.9)
<b>Preference for time of physical activity</b>			
Morning	232 (89.5)	8 (3.1)	16 (6.2)
Afternoon	3 (1.2)	11 (4.2)	41 (15.8)
Evening	24 (9.3)	194 (74.9)	31 (12.0)
<b>B: PHYSICAL ACTIVITY EDUCATION</b>			
<b>Preference for venue of physical activity education</b>			
Home	74 (28.6)	168 (64.8)	14 (5.4)
Community/fitness centre	12 (4.6)	68 (26.3)	9 (3.5)
Clinics/Diabetes centre	173 (66.8)	23 (8.9)	3 (1.2)
<b>Preference for source of physical activity education</b>			
Healthcare provider	182 (70.3)	51 (19.7)	14 (5.4)
Peers	38 (14.7)	33 (12.7)	49 (18.9)
Electronic media	24 (9.2)	41 (15.9)	176 (68.0)
Print media	15 (5.8)	33 (12.7)	20 (7.7)

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**Table 3: Preference for physical activity related issues.**

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	<b>n (%)</b>
<b>Preference for supervision</b>	
Supervised session	58 (22.4)
Unsupervised session	201 (77.6)
<b>Variability of physical activity</b>	
Same activity each session	150 (57.9)
Different activities each session	109 (42.1)
<b>Plan of physical activity</b>	
Flexible sessions	207 (79.9)
Fixed sessions	52 (20.1)
<b>Level of performance</b>	
At competitive level	36 (13.9)
At recreational level	223 (86.1)
<b>Desire for physical activity education</b>	
Yes	228 (88.0)
No	31 (12.0)
<b>Need for a physical activity partner</b>	
Nil	151 (58.3)
Diabetes peers	32 (12.4)
Non-diabetes friends	43 (16.6)
Family members	33 (12.7)

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**Table 4: Association between socio-demographic characteristics and most preferred venue of physical activity.**

	Home n (%)	Options other than home n (%)	$\chi^2$	P value
<b>Age group (yr)</b>				
Less than 50 (n = 36)	21 (58.3)	15 (41.7)	18.06	0.0001
≥50 (n = 223)	194 (87.0)	29 (13.0)		
<b>Sex</b>				
Female (n = 174)	146 (83.9)	28 (16.1)	0.3	0.58
Male (n = 85)	69 (81.2)	16 (18.8)		
<b>Occupational status</b>				
Employed (n = 169)	146 (83.4)	23 (13.6)	3.93	0.04
Not employed (n = 90)	69 (76.7)	21 (23.3)		
<b>*Earned monthly income (for the employed n = 169)</b>				
< 100,000 NGN (n = 122)	102 (83.7)	20 (16.3)	21.18	0.002
≥ 100,000 NGN (n = 47)	23 (48.9)	24 (51.1)		
<b>Level of education</b>				
Not educated (n = 46)	33 (71.7)	13 (28.3)	5.04	0.02
Educated (n = 213)	182 (85.4)	31 (14.6)		
<b>Marital status</b>				
Married (n = 211)	181 (85.8)	30 (14.2)	6.19	0.01
Not married (n = 48)	34 (70.8)	14 (29.2)		
<b>Type of settlement</b>				
Urban (n = 247)	210 (85.0)	37 (15.0)	15.25	0.0001
Rural (n = 12)	5 (41.7)	7 (58.3)		
<b>Duration of diagnosis (years)</b>				
< 10 (n = 111)	76 (68.5)	35 (31.5)	29.13	0.0001
≥ 10 (n = 148)	139 (93.9)	9 (6.1)		
<b>* 100,000 NGN (Nigerian naira) = 550 USD (United States dollars).</b>				

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**Table 5: Association between socio-demographic characteristics and most preferred source of physical activity education.**

	Health care providers	Options other than healthcare providers	$\chi^2$	P value
	n (%)	n (%)		
<b>Age group (yr)</b>				
Less than 50 (n = 36)	14 (38.9)	22 (61.1)	19.7	0.0001
≥50 (n = 223)	168 (75.3)	55 (24.7)		
<b>Sex</b>				
Female (n = 174)	143 (82.2)	31 (17.8)	36.02	0.0001
Male (n = 85)	39 (45.9)	46 (54.1)		
<b>Occupational status</b>				
Employed (n = 169)	150 (88.8)	19 (11.2)	79.56	0.0001
Not employed (n = 90)	32 (35.6)	58 (64.4)		
<b>*Earned monthly income (for the employed n = 169)</b>				
< 100,000 NGN (n = 122)	84 (60.9)	38 (31.1)	7.051	0.004
≥ 100,000 NGN (n = 47)	22 (46.8)	25 (53.2)		
<b>Level of education</b>				
Not educated (n = 46)	21 (45.7)	25 (54.3)	16.23	0.0001
Educated (n = 213)	161 (75.6)	52 (24.4)		
<b>Marital status</b>				
Married (n = 211)	164 (77.7)	47 (22.3)	30.29	0.0001
Not married (n = 48)	18 (37.5)	30 (62.5)		
<b>Type of settlement</b>				
Urban (n = 247)	176 (71.3)	71 (28.7)	2.47	0.116
Rural (n = 12)	6 (50.0)	6 (50.0)		
<b>Duration of diagnosis (yr)</b>				
< 10 (n = 111)	89 (80.2)	22 (19.8)	9.13	0.003
≥ 10 (n = 148)	93 (62.8)	55 (37.2)		

**\* 100,000 NGN (Nigerian naira) = 550 USD (United States dollars).**

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education provided either by healthcare providers or through other sources such as the print and electronic media was not significantly influenced by whether the patient lived in an urban or rural settlement, a significantly higher number of female participants ( $\chi^2 = 36.02$ ;  $p = 0.0001$ ) and those who were diagnosed less than 10 years before ( $\chi^2 = 9.13$ ;  $p = 0.003$ ) preferred to receive physical activity education directly from the healthcare providers rather than through any other means. Tables 4 and 5 provide additional details on associations of socio-demographic characteristics with preferences for venue of physical activity and source of physical activity education.

### Discussion

This study was conducted for the purpose of identifying the preferences of patients with T2DM in Nigeria, with respect to participating in physical activity programmes. The major findings include: 1) a majority of the participants would prefer their physical activity programmes to be in the form of walking, preferably in their respective homes, and in the morning hours, and none of them would readily consider swimming as an option, 2) most of the participants would prefer their physical activity sessions to be unsupervised, and in the form of recreational activities with adjustable sessions that will fit into their daily routine, 3) the majority of participants would like to receive physical activity education, but most of them would like to receive the education directly from healthcare providers such as doctors, nurses and exercise experts instead of from the print or electronic media, and 4) all the socio-demographic characteristics except sex and settlement types were respectively linked to the preference for

venue of physical activity, and source of physical activity education.

It was observed in the present study that walking was the most preferred physical activity by the sample of T2DM participants from Nigeria, which is similar to the findings in a previous study by Forbes et al (2010) among a Canadian population. The reason why the majority of the participants in the present study selected walking as their most preferred form of physical activity may be connected with its simplicity, and the fact that it readily fits into a typical daily routine. Walking has been described as a typical mild to moderate aerobic exercise that is easy to organize, and does not require specific skills, expensive equipment, or sophisticated preliminary medical evaluations (Negri et al, 2010). The overwhelming preference for walking may also be related to the generally low socioeconomic status of the participants, which makes walking the most readily available and affordable option. Although walking as a specific form of physical activity among Nigerian adults with T2DM has not been previously examined, one of the few studies that considered physical activity generally among the adult population in Nigeria, conducted by Oyeyemi et al (2013), had reported that participants who did not own a car were significantly more physically active than those who did. The authors further described the link between physical activity and some indicators of low socioeconomic status, reporting that the highest prevalence rates of physical activity were among participants who were divorced/separated, without a car, with a blue-collar job, with lower level of education and the lowest incomes (Oyeyemi et al, 2013). In the current study, it can be seen that more than half

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of the participants had only secondary school education or below and most of them had low earning capacity. The presence of these low socioeconomic indicators may have also influenced their choice of walking as the most preferred form of physical activity.

There is nothing wrong with the overwhelming choice of walking as the most preferred form of physical activity if only adequate intensity would be applied in terms of speed and duration. Johnson et al (2005) reported that walking could be the most acceptable form of physical activity to people with T2DM, even though little was known about their self-paced walking speed, which is a measure of intensity. It was eventually concluded that self-paced walking seemed inadequate to improve metabolic control in this group of patients (Johnson et al, 2005). More recently, the outcome of a randomized control trial on free-living interval walking indicated that walking training can be implemented in T2DM patients, but it was also pointed out that only minor or no beneficial effects have been shown, potentially indicating that the intensity of normal walking is insufficient (Karstoft et al, 2012). However, Gregg et al (2003) had earlier addressed a part of the intensity aspect by reporting that when compared with inactive individuals, the mortality rates of patients with diabetes were lowest for persons who walked 3 to 4 hours/week and for those who reported that their walking involved moderate increases in heart and breathing rates. Gregg et al (2003) concluded that one death per year may be preventable for every 61 persons who could be persuaded to walk at least 2 hours/week. Based on these reports, it can be deduced that the overwhelming preference for walking displayed by

participants in this study is not a problem if they are offered opportunities to learn about recommended walking intensities for health gains.

Walking can be prescribed in different forms to patients with T2DM. In a study to determine whether a recommendation to accumulate 10 000 steps per day, as documented by use of a pedometer, would result in significant improvements in clinical parameters in sedentary patients with T2DM, it was observed that the use of a pedometer was effective for promoting a healthy lifestyle (Araiza et al, 2006; Richardson et al, 2007). Group-based brisk walking is also effective in modulating glycaemic control and cardiovascular risk in patients with T2DM (Praet et al 2008) and an increase of regular physical activity equivalent to 45 min of walking 3 days/week may suffice to improve systolic and diastolic blood pressure, lipid metabolism and body mass index (BMI) in patients with T2DM (Fritz et al, 2006). In a recent meta-analysis on the impact of walking on glycaemic control and other cardiovascular risk factors among patients with T2DM, it was also reported that walking reduces HbA1c, BMI and diastolic blood pressure (Qiu et al, 2014).

Unlike a previous study in which swimming, resistance training, and cycling were the 3 types of activities that most interested the participants after walking (Forbes et al, 2010), swimming as a form of physical activity was not considered as a 1<sup>st</sup> or 2<sup>nd</sup> choice activity by all participants in the present study; a very small proportion considered it as their 3<sup>rd</sup> choice. It is not clear why the participants in this study did not consider swimming as a physical activity option. It is however thought that the widespread lack of interest may result from some

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form of hydrophobia, lack of swimming skills, or the fact that swimming facilities are not readily available to the populace, and the few facilities around operate on a fee for service basis. In view of this situation, swimming is unlikely to be an attractive choice of physical activity for this group of people based on their socioeconomic status indicators because, apart from lack of skill, most of them may not be able to afford the cost of having a swimming facility either in their homes or on a pay for service basis at public pools. Although this study did not probe into the role of pool hygiene, the low attractiveness of swimming as a form of physical activity may be influenced by the issue of cleanliness, as some of the participants may be concerned about the cleanliness of the public swimming pools that are available in the Nigerian setting. In the only readily available study about the hygiene of typical swimming pools in Nigeria conducted by Itah and Ekpombok (2004), the authors reported that various species of bacteria and fungi, most of which are known human pathogens were found in the various pools, probably as a result of faecal contamination by homoiotherms and poikilotherms. A host of anecdotal reasons on why participants would not like to swim could be proffered but a major drawback is the fact that studies that have considered swimming among patients with diabetes are generally not readily available. Although walking may be the most convenient low-impact mode of activity, some persons, because of peripheral neuropathy, may however need to do non-weight-bearing activities (Albright et al, 2000), and swimming is a good alternative in such circumstance (Forbes et al, 2010).

Participants in this study indicated what types of physical activity they would

prefer most, and the ones they will not readily adopt. However, a striking observation, which is inconsistent with empirical evidence is that most of them would prefer their physical activity sessions to be unsupervised. An advantage of unsupervised sessions as indicated by this group of Nigerian patients is the reduced cost implication. For instance, in the Canadian population where supervised sessions were preferred, feasibility issues were reported because of the cost of personal training sessions and availability of personal training facilities (Forbes et al, 2010). In a situation such as the one seen in the current study, where the majority of the people are not affluent, the vast preference for unsupervised physical activity sessions may actually be a step to cut down on their medical expenses. A major problem however with unsupervised sessions is the issue of compliance, which can be in terms of actual participation or performance at optimal intensities.

Even though much benefit is derivable from supervised sessions, metabolic improvement will only be attainable when there is adequate compliance (Negri et al, 2010). A systematic review of resistance training studies on T2DM patients found that supervised training of varying volume, frequency, and intensity improved blood glucose control and insulin sensitivity, but when supervision was removed, compliance and blood glucose control both deteriorated (Gordon et al, 2009). Another study also revealed that individuals with T2DM who engaged in supervised training exhibited greater compliance and blood glucose control than those who undertook exercise training without supervision (Colberg et

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al, 2010). An explanation for the differing observations of these previous studies compared to the present study is that this study concerned general physical activity programmes, while the previous studies focussed on specific physical exercise programmes. Perhaps supervision is not a strong necessity when it comes to general physical activity programmes. Besides the preference for unsupervised physical activity sessions, it was also interesting to note that most of the participants in this study would not bother to have physical activity partners, whereas the sample in a previous study by Forbes et al (2010) demonstrated a preference for engaging in physical activity with others, but then also shows that more people preferred to be alone when engaging in activities that are resistant in nature compared to aerobic activities.

An encouraging observation is that most of the participants would like to receive physical activity education, though the majority demand of receiving the education directly from healthcare workers may not always be feasible, because this could place a heavy burden on the healthcare providers. This burden is quite prominent because it has been reported that physical activity counselling services are usually provided by a variety of health care professionals who are responsible for the successful inclusion of this component into lifestyle behaviours (Mullooly and Kemmis, 2005). In effect, this means that longer time will be required to deliver a complete package of physical activity education to the patients, a situation that makes it essential to augment the process using other health education media. Physical activity education, like any other type of health education could be delivered through face-to-face options or through other

means such as the electronic and print media made up of the Internet, telephone, pamphlets, and magazines among others. Some of these media may however not make much impact because a substantial number of the participants may have difficulties receiving education through print and electronic media due to their literacy status (Nigeria.usembassy.gov, 2012), and computer and internet access problems (Osang, 2012; National Bureau of Statistics, 2011). Almost half of the participants in this study were either not literate at all or only acquired elementary primary education. This may explain the desire to receive direct education from healthcare providers since most of them may not readily comprehend education from other sources such as the internet, flyers, books, magazines etc. This is in addition to the fact that direct education would offer immediate opportunity to seek clarification, a chance that may not be readily available through the print and electronic media. Patients with poor functional health literacy have been reported to have difficulties reading and comprehending written medical instructions (American Medical Association, AMA, 1999; Schillinger et al, 2004) and this is common among patients who have low educational attainment, and among older patients (AMA, 1999).

It was observed that the participants' preference for physical activity venue and the source of physical activity education were both associated with all the socio-demographic characteristics except sex and settlement types respectively. In essence, this means that the sex of the participant did not matter when it comes to the preference for venue of physical activity, and living in a rural or urban settlement did not matter when it comes to preference for the source of physical

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activity education. The limitation with this particular finding is that only a few of the participants in this study actually came from the rural areas and this should be considered in interpreting this finding. Although there were only a few rural dwellers found in this study, the fact is that a large proportion of Nigeria's population actually resides in the rural areas. This may be pointing to the fact that only a few of rural dwellers seek healthcare in the tertiary health facilities located in the urban cities. This trend may have to do with their seemingly low socioeconomic status. According to Akinola (2007), the majority of Nigerians live in rural areas, but they are less vocal, hence they are more or less neglected. Akinola (2007) further stated that the rural area in Nigeria is characterised by a culture of poverty, as most people still live barely above subsistence level. In sub-Saharan Africa, rural and urban populations differ demographically, in socioeconomic and cultural composition, and in proximity to formal and informal sources of health care (Okeke and Okeibunor, 1991). In the present study, significant preference for physical activity within the home of the patient, and significant preference for physical activity education from healthcare providers were simultaneously indicated more among patients who were employed, had lesser income, were educated, married, and 50 years and above. The age bracket was however higher in a study by Forbes et al (2010) among a Canadian population where it was found that with respect to age difference, participants 64 years of age and under were more likely to prefer to receive physical activity counseling from an exercise specialist than their older counterparts.

With about 3.9 million cases, Nigeria tops the list of countries in Africa with the highest number of people with diabetes mellitus (IDF, 2013), a situation that begs for the adoption of all available strategies for the control of the disorder. Studies have already established that cross-sections of patients with T2DM in Nigeria have sub-optimal physical activity levels (Adeniyi et al, 2010; Adeniyi et al, 2012; Adeniyi et al, 2013), but this current study is perhaps the first in Nigeria and one of the few in Africa if any, that will demonstrate the physical activity preferences of patients with T2DM in this region. A clinical and public health relevance of this study is that for patients within the Nigerian context and other regions similar to Nigeria, physical activity participation may be improved if some of the findings are considered in the planning of physical activity programmes. For instance, this study and the few similar ones are unanimous that patients with T2DM will prefer to undertake physical activity programmes that involve walking, hence the need to always factor this into planning. It could also be seen that the participants preferred their activities to be within the home, but in order to be effective, there would be a need for closer examination of the prescription of walking within the home setting. Hence, this study forms a bridge between the thoughts of the physical activity practitioner and the actual preference of the patients with T2DM, a situation that will help to enhance effectiveness, acceptability and adherence to physical activity programmes. One of the limitations of this study is the fact there were essentially no previous literature from Nigeria on similar topics to compare. Efforts were however made to utilize the few studies available from

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other regions of the globe. It should also be noted that the various physical activity preferences of the T2DM patients in this study may also have been influenced by some comorbidities such as symptoms of peripheral neuropathy and other co-existing medical and psychological morbidities which could not be excluded totally.

### Conclusions and Recommendations

This cross-sectional study demonstrates that walking is the most preferred and swimming the least preferred form of physical activity among a group of Nigerian patients with T2DM, suggesting the need to devise various means of ensuring that walking as a form of activity is prescribed in a manner that will make it not only safe but equally effective. The preference for physical activity education directly from healthcare workers as against the print or electronic media was also observed. The study also demonstrates that the preference for venue of physical activity and the preference for the source of physical activity education were both simultaneously associated with all the socio-demographic characteristics except sex and type of residential settlement respectively. In order to avoid monotony of activities, there is a need for detailed patient education concerning all the other beneficial activities that the patients have decided to avoid. There is also a need for healthcare providers to acquire the necessary wherewithal to provide the best physical activity education for their patients.

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