KNOWLEDGE AND PRACTICE OF EXERCISES AMONG PATIENTS WITH TYPE II DIABETES MELLITUS IN LAGOS, NIGERIA

Authors:

Aweto HA[1] (Ph.D), Ajepe TO[1] (Ph.D), Okunlola OS[1] (B.PT)

Author Affiliations:

[1]Department of Physiotherapy, Faculty of Clinical Sciences, College of Medicine, University of Lagos, PMB 12003, Idi-Araba, Lagos, Nigeria.

Corresponding Author:

Dr. Happiness Anulika Aweto,

E-mail: awetohappiness@gmail.com **or** haweto@unilag.edu.ng

Phone number: +2348028964385 or +2347032790407

ABSTRACT

Background: Exercise has been proven to be an effective means of glycemic control. However, the knowledge and the practice of exercises among patients with Type II diabetes mellitus is uncertain.

Aim of study: The aim of this study was to investigate the knowledge and practice of exercises for glycemic control among patients with Type II diabetes mellitus in Lagos, Nigeria.

Materials and Methods: This cross-sectional analytical survey was carried out involving 140 (90 females and 50 males) patients with Type II diabetes mellitus. They were recruited from selected hospitals in Lagos State, Nigeria. A questionnaire was used to obtain information on the knowledge and pattern of practice of exercises among these patients. Spearman's rank order correlation was used to determine the relationship between selected socio-demographic characteristics and knowledge and practice of exercises. The level of significance was set at $p \leq 0.05$.

Results: The knowledge of exercise among respondents was good (mean score of 55.45 ± 8.79 out of a maximum score of 72). A good number (72.1%) of the respondents indicated regular practice of exercises. There was a significant correlation between age, level of educational attainment and knowledge and practice of exercise ($p< 0.05$). There was also a significant correlations between monthly income and practice of exercise ($p= 0.001$) but there was none between monthly income and knowledge of exercise by the patients.

Conclusion: There was a high level of knowledge and practice of exercise among patients with Type II diabetes mellitus and these were influenced by their age and level of educational attainment.

Keywords: Knowledge, Practice, Exercise, Glycemic control, Diabetes

INTRODUCTION

Diabetes has become a widespread epidemic, primarily because of the increasing prevalence especially Type II diabetes.[1] Its major contributing factors are rising physical inactivity and obesity.[1] It was estimated that the world prevalence of diabetes among adults (aged 20 to 79 years) would be 6.4%, affecting 285 million adults, in 2010, and will increase to 7.7%, and 439 million adults by 2030.[2] Type II diabetes mellitus (T2DM) which is characterized by improper utilization of insulin by target cells and tissues accounts for 85 to 95% of all diabetes in high-income countries with higher dominance in developing countries. Hence, the cause of serious global health concern.[3]

People living with T2DM are vulnerable to various forms of short and long-term complications, which often lead to their premature death. This tendency of increased morbidity and mortality seen in these patients with T2DM may be because of its insidious onset and late recognition, especially in resource-poor developing countries like Africa.[4]

Regarding the management of T2DM, exercise has been considered as one of the cornerstones in the treatment along with nutrition and medication.[5-7] As evidenced by a study carried out by Osho et al.[8], progressive aerobic and resistance exercises have positive effects on the pulmonary functions of individuals with T2DM in Nigeria.

Similarly, general findings of the study carried out by Bagheri et al.[9] indicated the positive effects of aerobic exercise on glycemic control with significant decrease in fasting blood sugar (FBS) in men with T2DM.

Even though pharmacological approaches in the management of T2DM are necessary, the high cost of these drugs makes affordability difficult over time. This is because most of the population affected by this disease reside in the low and middle income countries. Therefore, the fact that exercise may be cheap, affordable and highly effective in the prevention or delay in development of T2DM as well as in the control of blood glucose, should make it a motivating factor for patients with T2DM to practise it.[10,11]

Despite having enough evidence to support the benefits of exercise, initiating and adhering to regular practice of exercise has become difficult. In various communities, factors such as individual differences, socio-cultural and environmental reasons and barriers may hinder the adherence to regular exercise.[12] Studies on the level of knowledge, attitude and practise of exercise among patients with T2DM in Nigeria are few, hence, the need to evaluate the knowledge and practice of exercises among patients with T2DM in Lagos, Nigeria.

METHODS

Prior to the commencement of the study, ethical approval was sought and obtained from the Health Research and Ethics Committee of the College of Medicine University of Lagos, Idi-Araba, Lagos (CMUL/HREC/05/17/141). This cross sectional survey involved 140 individuals who were already diagnosed with T2DM and were being managed at the outpatient clinics of the Lagos University Teaching Hospital (LUTH), Lagos State University Teaching Hospital (LASUTH) and Nigerian Air Force Hospital (NAFH), Lagos. This sample size was calculated using the formula developed by Cochran[13] which is:

$$n = \frac{Z^2 PQ}{d^2}$$

where;

n = sample size

Z = confidence interval set at 1.96 for 95% confidence rate

P = prevalence rate (proportion in target population estimated) based on the previous studies or pilot studies. Using the prevalence of T2DM (10.5%)[14]

P = 10.5% = 0.105

Q = (1- P) = 1- 0.105= 0.895

d = precision value set at 0.05

Hence, sample size (n) = 144.406 = 144.

Individuals included in this study were patients already diagnosed with T2DM who were receiving treatment at LUTH, LASUTH and NAFH, those with T2DM who did not have

cognitive impairments and those who were still able to carry on with activities of daily living (ADL). Patients excluded from this study were patients diagnosed with T2DM who were critically ill, who presented with one or more forms of disability and with severe complications of Diabetes Mellitus (DM), such as grade 2 or 3 neuropathy, nephropathy, and retinopathy.

The socio-demographic characteristics (age, gender, height, weight, body mass index, level of education and monthly income) and duration of diabetes from diagnosis were obtained and recorded for each participant. A questionnaire adapted from the study of Chadchavalpanichaya and Intaratep[15] on "Exercise behaviour and knowledge among DM type II patients" was used to obtain information on the knowledge and practice of exercise from the participants. It is a 30 item questionnaire which consisted of three sections namely:

It consisted of three sections;

Section 1: socio-demographic status which includes age, gender, marital status, highest educational attainment and average income of the patient,

Section 2: Knowledge of the patient on exercises,

Section 3: Practice pattern of exercises.

The knowledge section of the questionnaire was scored on a scale of 0 to 72. Total scale score was calculated by summing the total number of correct answers. Higher scores indicate a higher level of knowledge of exercise.

The practice pattern section had a combination of if they were referred for physiotherapy for proper supervision of their exercise periods, what was the frequency and duration of their exercises and hinderances to regularly performance of exercises etc. The questionnaires were collected after completion.

Data Analysis

Data were summarized using descriptive statistics of mean, standard deviation, frequency, and percentage and the results were presented on tables and charts. Spearman's rank order correlation coefficient was used to determine the relationship between age, educational attainment, economic status, and knowledge as well as practice of exercises.

RESULTS

A total of 144 questionnaires were given out. However, four individuals with T2DM declined being interviewed while 140 individuals gave their consents to participate in this study. The participants comprised of 90 (64.3%) females and 50 (35.7%) males. They had a mean age of 58.86 ± 14.79 years (males: 54.36 ±14.94 years and females: 61.36 ± 14.17 years). The mean BMI of the participants was 23.61 ±3.49 (male 23.70 ±3.59, female 23.57 ±3.45) (Table 1).

Forty-three (30.7%) participants had primary school as their highest level of educational attainment while 25 (17.9%) had tertiary education as their highest educational attainment. About half of the respondents were maimed (76, 54.3%) while (34, 24.3%) were widowed (Table I). About a third (51, 36.4%) of the respondents were self-employed while 42 (30.0%) were unemployed (Table 2). The monthly income of the respondents was grouped into three as classified by Chukwuonye et al.[16] Many [87 (62.1%)] of the respondents were earning between the Nigerian minimum wage and 85,000 naira while 16 (I I .4%) respondents earned less than the minimum wage (Table 2).

Overall Assessment of the Knowledge of Exercise among the Respondents

The knowledge score of the respondents ranged from 32 to 70 with overall mean score of

55.45 ± 8.79. The male respondents had a mean score of 55.34 ± 8.69 which is similar to the female respondents who had a mean score of 55.52 ± 8.89.

Knowledge of the Respondents on the Benefits of Exercise

It was observed that almost all (136, 97.1%) the respondents stated that exercise is effective for weight reduction, similarly most (128, 91.4%) stated that exercise enhances diabetes mellitus (DM) control. However, only some 56 (40.0%) respondents reported that exercise can improve vision (Table 3). It was also observed that only about half (77, 55.0%) of the respondents acquired their exercise knowledge from a health care provider (Table 3).

Knowledge of the Respondents on how Exercise should be carried out

Half (70, 50.0%) of the respondents stated that the proper frequency of exercise should be 3-5 days per week and 76 (54.3%) of the respondents stated that the proper duration of exercise should be 20-30 minutes per day. Additionally, more than half (79, 56.4%) of the respondents did not know of the necessity of a warm up prior to main exercise, meanwhile, more than two-third (107, 76.4%) of the respondents stated their cognizance of a cool down being necessary after exercising (Table 3).

Knowledge of precautionary measures while carrying out exercise(s)

Concerning precautionary measures while exercising, it was observed that 53, (37.9%) of the respondents agreed that patients with T2DM should not exercise in extreme weather conditions while majority of the respondents (120, 85.7%) stated that patients with T2DM should stop exercising when having abnormal symptoms (Table 4).

Knowledge of respondents on symptoms of extreme blood sugar reduction and factors for discontinuation of exercise

Just below half (68, 48.6%) of the respondents were aware of the possibility of extreme blood sugar reduction occurring while exercising. It was thus observed that 58 (41.4%) knew sweating as a symptom of extreme blood sugar reduction (Table 5).

It was also observed that chest discomfort was indicated by 86 (61.4%) respondents as a factor to discontinue exercise while loss of balance had the least (48, 34.3%) indication by respondents as a factor to discontinue exercise (Table 5).

Assessment of the Practice level of Exercise among the Respondents

Of the 140 respondents, 101 (72.1%) respondents said they engaged in one or more exercise(s) regularly, while 39 (27.9%) respondents stated that they do not engage in any form of exercise (Figure 1).

Pattern of Practice of Exercise(s)

Of the 101 respondents who exercise, 38 (27.1%) of the respondents engaged in exercises every day while a few (7, 5.0%) of the respondents engaged in exercises less than once per month (Table 6). It was observed that more than two-thirds (69, 49.3%) of the respondents who exercised engaged in it for a duration of less than 30 minutes. Sixty-six (47.1%) engaged in walking as a form of exercise while 15 (10.7%) respondents engaged in swimming. Other forms of exercises adopted by respondents included stretching, skipping and the use of a treadmill. Also fifty-nine (42.1%) respondents do not monitor their pulse rate while exercising. Only 6 (4.3%) respondents always monitor their pulse rate while exercising (Table 6).

It was also observed that more than two-thirds (106, 75.7%) of the respondents stated that they were not referred to the Physiotherapy Department for exercise prescription and training, and on the other hand, only 34 (24.3%) respondents were referred to the Physiotherapy Department for an exercise programme.

Among the various reasons given by respondents who do not exercise, the lack of motivation (19, 13.6%) was the highest reason (Figure 2).

Correlations between knowledge of the benefits of exercise and selected socio-demographic characteristics (age, level of educational attainment and monthly income)

There was a significant correlation (p = 0.003) between age and knowledge of the benefits of exercise among respondents with T2DM.

There was a significant correlation (p = 0.001) between educational attainment and knowledge of the benefits of exercises among respondents with T2DM. However, there was no significant correlation (p = 0.368) between the monthly income and knowledge of the benefits of exercise among respondents with T2DM (Table 7).

Correlation between practice of exercises and selected socio-demographic characteristics (age, level of educational attainment and monthly income)

There was a significant relationship (p = 0.001) between age and the level of practice of exercises among respondents with T2DM. There was a significant relationship (p = 0.002) between educational attainment and the level of practice of exercises among respondents with T2DM. Similarly, there was a significant relationship (p=0.001) between the monthly income and the level of practice of exercises among respondents with T2DM (Table 8).

Table 1: Age and Physical Characteristics of the Respondents (n=140)

Variable	Male		Female		Total	
		SD		SD		SD
Age (years)	54.36	14.94	61.36	14.17	58.86	14.79
Weight (Kg)	71.44	10.31	70.04	10.41	70.54	10.36
Height (m)	1.74	0.08	1.73	0.08	1.96	0.08
BMI (Kgm^{-2})	23.70	3.59	23.57	3.45	23.61	3.49

Key: Kg – Kilogram, m – Meters, SD - Standard deviation

Table 2: Socio-demographic Characteristics of the Respondents

	Variables	Frequency (n)	Percentage (%)
Marital Status	Married	76	54.3
	Single	12	8.6
	Widowed	34	24.3
	Cohabiting	2	1.4
	Separated	9	6.4
	Divorced	7	5.0
Educational attainment	No formal education	8	5.7
	Incomplete primary education	13	9.3
	Primary education	43	30.7
	Secondary education	19	13.6
	Diploma	17	12.1
	Tertiary education	25	17.9
	Postgraduate studies	15	10.7
Occupational status	Student	5	3.6
	Unemployed	42	30.0
	Self employed	51	36.4
	Government employed	23	16.4
	Employed in Private company	18	12.9
	Others	1	0.7
Income status (naira)	< 18,500	16	11.4
	18,500 – 85,000	87	62.1
	> 85,000	27	19.3
	Didn't respond	10	7.14

Table 3: Knowledge of Respondents on Exercise

	Variables	Frequency (n)	Percentage (%)
Benefits of Exercise	Increase endorphin release	98	70.0
	Prevent osteoporosis	128	91.4
	Enhance lipid control	98	70.0
	Enhance BP control	117	83.6
	Enhance DM control	128	91.4
	Improve GI function	66	47.1
	Strengthen muscles	130	92.9
	Reduce stress	79	56.4
	Increase cardiopulmonary fitness	135	96.4
	Reduce weight	136	97.1
	Clearer vision	56	40.0
The acquisition of knowledge	Health care provider	77	55.0
	Mass media (TV, Radio)	14	10.0
	Internet	24	17.1
	Reading	32	22.9
	Attending a course	15	10.7
	Others	22	
Proper exercise frequency	Never	4	2.9
	1 day a week	19	13.6
	2 days a week	47	33.6
	3 – 5 days a week	70	50.0
Proper duration	Less than 10 minutes per day	14	10.0
	10 – 15 minutes per day	13	9.3
	15 – 20 minutes per day	37	26.4
	20 – 30 minutes per day	76	54.3
Warm up	Yes	41	29.3
	No	20	14.3
	I don't know	79	56.4
Cool down	Yes	107	76.4
	No	5	3.6
	I don't know	28	20.0

Table 4: Knowledge of Precautionary Measures while carrying out Exercises

Variables	Yes n (%)	No n (%)	I don't know n (%)
T2DM should consult their health care provider for proper program	121 (86.4)	6 (4.3)	13 (9.3)
T2DM should have their BP checked before exercise	119 (85.0)	2 (1.4)	19 (13.6)
T2DM should not exercise in extreme weather conditions	53 (37.9)	18 (12.9)	69 (49.3)
T2DM should not do heavy exercise alone	101 (72.1)	12 (8.6)	27 (19.3)
T2DM should practice aerobic exercise	126 (90.0)	1 (0.7)	13 (9.3)
T2DM should wear proper shoe	78 (55.7)	5 (3.6)	57 (40.7)
T2DM should stop exercise when having abnormal symptom	120 (85.7)	7 (5.0)	13 (9.3)

Table 5: Knowledge of Respondents on Symptoms of Extreme Blood Sugar Reduction and Factors for Discontinuation of Exercise

	Variables	Frequency (n)	Percentage (%)
Symptoms of extreme blood sugar reduction	Dizziness	46	32.9
	Hungry	44	31.4
	Sweating	58	41.4
	Fainting spell	55	39.3
	Rapid heart rate	53	37.9
Factors for discontinuation of exercise	Severe leg pain	65	46.4
	Difficulty in	81	57.9
	breathing	57	40.7
	Nausea and vomiting	74	52.9
	Dizziness	48	34.3
	Loss of balance	86	61.4
	Chest discomfort		

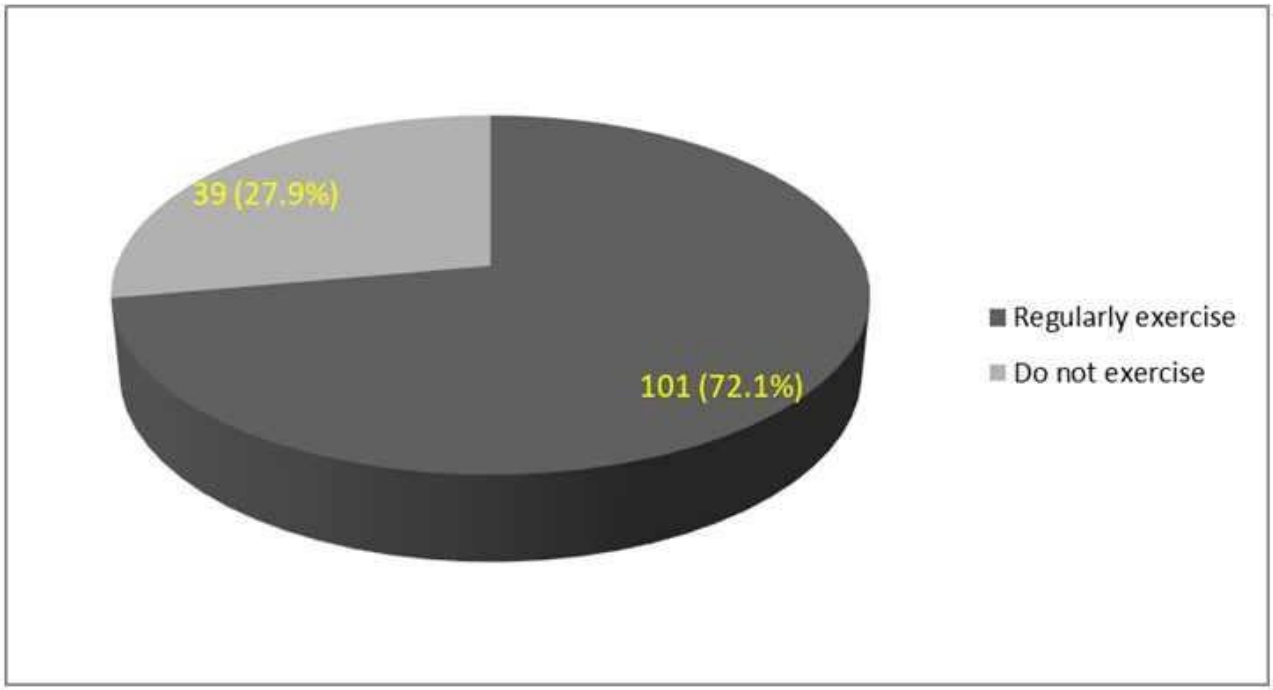

Figure 1: Respondents who engaged in exercise(s).

Table 6: Practice Pattern of Exercise by Respondents

	Variables	Frequency (n)	Percentage (%)
Frequency	Every day	38	27.1
	3-5 times per week	25	17.9
	1-2 times per week	26	18.6
	1-2 times per month	5	3.6
	Less than 1 time per month	7	5.0
Duration	Less than 30 minutes	69	49.3
	30-60 minutes	23	16.4
	More than 60 minutes	1	0.7
	Uncertain	8	5.7
Continuation of exercise	Less than 3 months	30	21.4
	3-6 months	44	31.4
	More than 6 months-1 year	18	12.9
	More than 1 year	9	6.4
Time of the day			
	Morning	52	37.1
	Late morning	6	4.3
	Afternoon	3	2.1
	Evening	14	10.0
	Before bedtime	7	5.0
	Uncertain	19	13.6
Place	House	68	48.6
	Nearby the house	15	10.7
	Park	7	5.0
	Sport club	5	3.6
	Stadium	13	9.3
	Uncertain	7	5.0
Companions	None	52	37.1
	1-2	43	30.7
	3-5	3	2.1
	More than 5	3	2.1
Type of exercise	Walking	66	47.1
	Swimming	15	10.7
	Jogging	30	21.4
	Attending aerobic exercise class	16	11.4
	Using exercise machine	20	14.3
	Others	18	12.8
Self-pulse monitoring	No	59	42.1
	Yes-some times	26	18.6
	Yes-every times	6	4.3

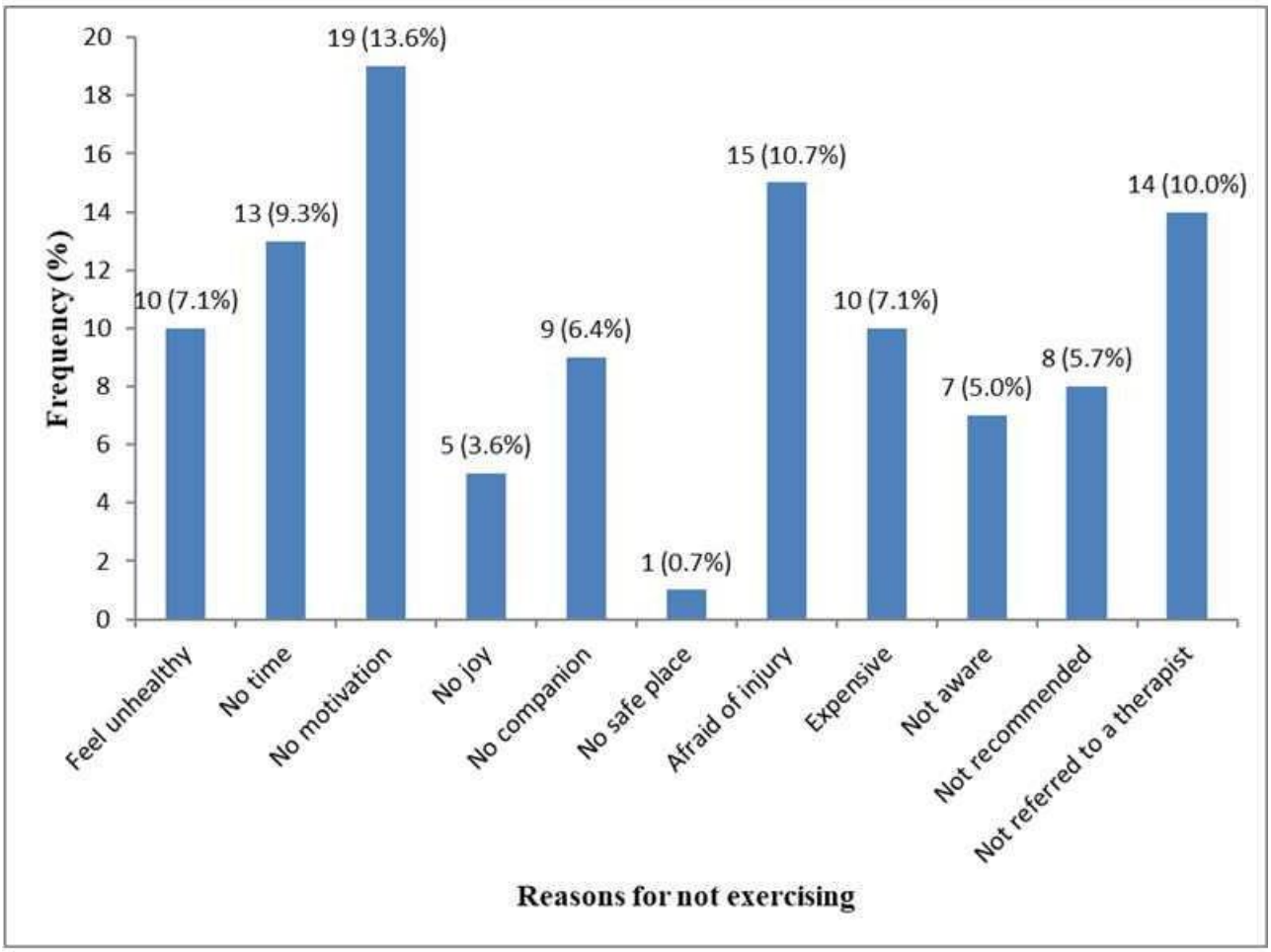

Figure 2: Reasons for not engaging in Exercise by the Respondents.

Table 7: Correlations between Selected Socio-Demographic Status and Knowledge of the Benefits of Exercise of the Respondents using the Spearman's Rank Order correlation

Variables	r_s value	p-value
Age	-0.249	0.003*
Educational attainment	0.293	0.001*
Monthly income	0.080	0.368

*Significance at p= 0.05

Key: r_s – Spearman's rho

Table 8: Correlations between Selected Socio-Demographic Status and Practice Level of Exercise of the Respondents using the Spearman's Rank Order correlation

Variables	r_s value	p-value
Age	0.466	0.001*
Educational attainment	-0.265	0.002*
Monthly income	-0.298	0.001*

***Significance at p= 0.05**

Key: r_s – Spearman's rho

DISCUSSION

The aim of this study was to investigate the knowledge and practice of exercises for glycemic control among patients with T2DM. The respondents had good knowledge (55.45 ± 8.79 out of a total score of 72) of exercise in diabetes mellitus (DM) with male and female respondents having almost equal scores (55.34 ± 8.79 out of a total score of 72) of exercise in diabetes mellitus (DM) with male and female respondents having almost equal scores (55.34 ± 8.69 and 55.52 ± 8.89 respectively).

This implies that both genders knew the importance of exercise in DM. This corroborates a study conducted by Awotidebe et al.[17] which reported that patients demonstrated good knowledge of exercise for plasma blood glucose control.

Despite the overall good knowledge of the effect of exercise in glycemic control, many respondents (87, 62.1%) did not know that exercises should not be carried out in extreme weather. Exercising in extreme weather puts extra stress on the body and increases the core body temperature. Many of respondents thought that exercising was only beneficial for their weight reduction thus highlighting their knowledge of the importance of weight control in the treatment of T2DM. Even though most knew the proper frequency and duration of exercise, many did not know the benefits of a warm up session as an integral component of conditioning the body prior to exercising. Warm-up gently prepares the body for exercises by gradually increasing the heart rate and circulation. This will loosen the joints and increase blood flow to the muscles.

Many did not know the importance of wearing proper shoes while exercising as this is necessary considering the fact that diabetic patients are prone to foot injuries especially diabetic foot ulcer.[18]

It is intriguing that majority of the respondents knew they should stop exercising when they have abnormal symptoms, although most of them thought more of sweating as an abnormal symptom. Other abnormal symptoms such as dizziness and hunger should have been considered. A good number of the respondents were aware of factors for discontinuing exercise such as dizziness, difficulty in breathing, chest discomfort and severe leg pain but only a few knew about loss of balance.

On the assessment of actual practice of exercise, a satisfactory number of respondents responded positively to practice of exercise, with more than two-third (101, 72.1%) stating that they regularly engaged in one or more forms of exercises for an average of 30 minutes every day. This report differs from the report by Awotidebe et al.[17] which stated that there was negative attitude and poor practice of exercise among patients with T2DM. Most of them carried out walking which was often done in the morning in their residence. Evidently a number of them engaged in exercise more than three times a week thus corroborating their knowledge of how exercises should be carried out. It is worth noting that many (59, 42.1%) of the respondents stated their non-adherence to

monitoring their heart rate while exercising. Monitoring the heart rate is essential in order to detect any change in the heart rate while exercising as early as possible. Exercising with the calculated target heart rate range is essential. Among those who indicated not exercising, lack of motivation, fear of injury and not being referred to an exercise expert were the most reported reasons. This implies that the patients must be adequately educated, referred to the physiotherapist and motivated to engage in exercise.

Concerning the relationship between age and knowledge of the benefits of exercise as well as level of practice of exercise among patients with T2DM, there was an inverse significant relationship between the age and knowledge. This implies that with increasing age, knowledge of effects of exercise decreases. This may be brought about by the younger population having higher thirst for knowledge on the various available ways for managing their condition than the older population.[19] It was however also noted that there was a significant positive correlation between age and the level of practice of exercise. This implies that with increase in age, the practice of exercise may increase.

This shows that despite the higher knowledge among the younger population, they do not practice exercise as they ought to. They may be busy with various time consuming activities of daily living when compared with the elderly people who have the time to practice it.

The strong positive correlation between the level of educational attainment and knowledge was not unexpected as the higher the level of educational attainment, the higher the knowledge on the benefits of exercises. This is consistent with the study of Hui et al.[20] where education level attainment was found to positively associated with knowledge of physical activity among patients with diabetes mellitus. However, there was an inverse relationship between the level of educational attainment and level of practice of exercise. This implies that many of the respondents with higher level of education, who also have higher knowledge of the benefits of exercise, rarely practice it. This may also be as a result of busy schedules, as the higher the level of educational attainment, the more likelihood for such individuals to be involved in highly demanding and time consuming jobs which may not afford them the needed time for exercise.

Concerning the relationship between monthly income of the respondents and knowledge of the benefits of exercise as well as level of practice of exercise among patients with T2DM, there was no significant relationship between the income and knowledge; however, there was an inverse relationship between income and the level of practice of exercise. This suggests that the level of income may not influence how knowledgeable an individual is about exercise however it may influence the practice of exercise as many with high monthly income rarely practice exercising. The reason may be that those with high monthly income have high economic power to afford the luxurious things of life that make them live sedentary lifestyles while the reverse is the case with those with lower monthly incomes.

It was observed that there was a poor level of awareness of the importance of physiotherapy in the prescription and supervision of exercise which is a key component of the management of T2DM by physicians. This was evident as almost three quarters of the respondents stated that they were not informed on the importance physiotherapy for exercise prescription.

The findings from this study therefore necessitates the need for strong advocacy for better education of patients with T2DM on the importance of exercise, the precautionary measures for safe exercising such as proper warm up and cool down, regular heart rate and blood sugar monitoring, wearing of protective shoes, not exercising in extreme weather conditions and others as well as ensuring adherence to practice of exercise. In order to ensure adherence and safe practice of exercise, it is necessary for these patients to be appropriately referred for physiotherapy by physicians where exercise can be appropriately prescribed and supervised.

CONCLUSION

There was good knowledge of the benefits of exercise by patients with T2DM but poor knowledge of the precautionary measures to be taken while exercising. Also, a good number of the patients indicated regular practice of exercise but the number could be more. It is noteworthy that most exercises carried out by these patients were not prescribed and supervised by the physiotherapist.

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KNOWLEDGE AND PRACTICE OF EXERCISE AMONG PATIENTS WITH TYPE II DIABETES

SECTION A: SOCIO-DEMOGRAPHIC AND PHYSICAL CHARACTERISTICS (Please tick as appropriate)

1. Age as at last birthday _____(years)
2. Sex: (a) Male { } (b) Female { }
3. Height: _____meters
4. Weight: _____kilograms
5. Marital Status: (a) Single { } (b) Married { } (c) Cohabiting { } (d) Separated { } (e) Divorced { } (f) Widowed { }
6. Highest level of Educational attainment: (a) No formal education { } (b) Incomplete primary education { } (c) Primary education { } (d) Secondary education { } (e) Diploma { } (f) Tertiary education { } (g) Post graduate education { }
7. Occupation: (a) Students { } (b) Unemployed { } (c) Self-employed { } (d) Government employed { } (e) Employed in private company { } (f) Others please specify _____
8. Monthly income (Naira): (a) ≤ 18,500 { } (b) ≤ 85,000 { } (c) > 85,000 { }
9. Presence of associated disease: (a) No { } (b) Yes { }
10. If “yes” to question 9, which associated disease(s) is/are present?

Hypertension { }
Hyperlipidemia { }
Heart disease { }
Musculoskeletal problems { }
Asthma/pulmonary problems { }
Others please specify _____

SECTION B: KNOWLEDGE OF PATIENTS ON EXERCISE (Please tick as appropriate)

11. Which of the following are the benefits of exercise?

It makes someone feel good Yes { } No { } I don't know { }

It makes bones stronger Yes { } No { } I don't know { }

It controls blood cholesterol level Yes { } No { } I don't know { }

It enhances blood pressure control Yes { } No { } I don't know { }

It enhances blood sugar control Yes { } No { } I don't know { }

It aids digestion Yes { } No { } I don't know { }

It strengthens the muscles Yes { } No { } I don't know { }

It reduces stress Yes { } No { } I don't know { }

It makes someone physically fit Yes { } No { } I don't know { }

It helps to reduce ones weight Yes { } No { } I don't know { }

It makes someone vision clearer Yes { } No { } I don't know { }

1. How did you become aware of the benefits of exercise in Diabetes Mellitus (DM)?

Health care provider { }

Mass media (TV, Radio) { }

Internet { }

Reading (Newspaper, Print media) { }

Attending a course { }

Others please specify ……

2. How should aerobic exercise such as walking, jogging, running be carried out?

i. Proper frequency of exercise is?

Never { }

1 day a week { }

2 days a week { }

3 – 5 days a week { }

ii. How much time did you usually spend doing moderate physical activities like gardening, cleaning, bicycling at a regular pace, swimming or other fitness activities? _____hours____minutes

iii. How much time did you usually spend doing vigorous physical activities like heavy lifting, heavier garden or construction work, chopping woods, aerobics, jogging/running or fast bicycling? _____hours____minutes

iv. Proper duration of exercise is?

Less than 10 minutes per day { }

10 – 15 minutes per day { }

15 – 20 minutes per day { }

20 – 30 minutes per day { }

iii. Warm up is important before exercise

Yes { } No { } I don't know { }

iv. Cool down is important after exercise

Yes { } No { } I don't know { }

14. Knowledge of precautionary measures while carrying out exercise

Patient with diabetes mellitus should consult their health care provider for proper program Yes { } No { } I don't know { }

Patients with diabetes mellitus should have their blood pressure checked before exercising Yes { } No { } I don't know { }

Patient with diabetes mellitus should not exercise in extreme weather conditions (too cold, too hot) Yes { } No { } I don't know { }

Patient with diabetes mellitus should not do heavy exercise alone Yes { } No { } I don't know { }

Patient with diabetes mellitus should practice aerobic exercise such as walking, jogging, running etc Yes { } No { } I don't know { }

Patient with diabetes mellitus should wear proper shoes while exercising Yes { } No { } I don't know { }

Patient with diabetes mellitus should stop exercise when having abnormal symptom Yes { } No { } I don't know { }

15. Can patients with diabetes mellitus have extreme blood sugar reduction while exercising? Yes { } No { } I don't know { }

16. If yes to question 15, which of the following symptoms of extreme blood sugar reduction are you aware of?

Dizziness	Yes { }	No { }	I don't know { }
Hungry	Yes { }	No { }	I don't know { }
Sweating	Yes { }	No { }	I don't know { }
Fainting spell	Yes { }	No { }	I don't know { }
Rapid heart rate	Yes { }	No { }	I don't know { }

17. Which of the following symptoms would a patient with diabetes mellitus observe while exercising to discontinue exercise?

Severe leg pain	Yes { }	No { }	I don't know { }
Difficulty in breathing	Yes { }	No { }	I don't know { }
Nausea & vomiting	Yes { }	No { }	I don't know { }
Dizziness	Yes { }	No { }	I don't know { }
Loss of balance	Yes { }	No { }	I don't know { }
Chest discomfort	Yes { }	No { }	I don't know { }

SECTION C: PRACTICE PATTERN OF PHYSICAL EXERCISE (Please tick as appropriate)

18. Did your Doctor recommend exercise programme for you as part of the management of your Diabetes? Yes { } No { }
19. If yes to question 18, were you referred to the Physiotherapy department for the exercise programme? Yes { } No { }
20. Do you think carrying out exercise with the supervision of the Physiotherapist is necessary? Yes { } No { } I don't know { }
21. Do you regularly exercise on your own with or without supervision of a Physiotherapist? Yes { } No { }

    If your answer to Q21 is a “NO”, go to Q30
22. If yes to question 21, with or without supervision, how regularly do you carry out exercise?

Every day { }
3-5 times per week { }
1-2 times per week { }
1-2 times per month { }
Less than 1 time per month { }
Others please specify _____

23. For how long do you carry out exercises per time?
Less than 30 minutes { }
30-60 minutes { }
More than 60 minutes { }
Uncertain { }
Others please specify _____
24. For how long have you been consistent in carrying out exercise?
Less than 3 months { }
3 – 6 months { }
More than 6 months – 1 year { }
More than 1 year { }
25. What time of the day do you normally carryout exercise
Morning { }
Late morning { }
Afternoon { }
Evening { }
Before bedtime { }
Anytime { }

26. Where do you carry out your exercise?
House { }
Nearby the house/street { }
Park { }

Sport club { }
Stadium { }
Uncertain { }
Others please specify _____

27. How many companions do you usually have when exercising?
None { }
1-2 { }
3-5 { }
More than 5 { }

1. What type of exercise do you usually do?
Walking { }
Swimming { }
Jogging { }
Attending aerobic exercise class { }
Using exercise machine { }
Others please specify _____

2. Do you monitor your pulse rate while exercising
No { }
Yes-sometimes { }
Yes-every times { }

3. If No to question 21, what is/are the reason(s) for not exercising regularly (you can tick more than one option)
Feel Unhealthy { }
Lack of time { }
No Motivation { }
No Joy { }
No Companions { }
No safe place { }
Afraid of getting injured { }
I think it is expensive { }
Not aware of the benefits { }
Was not recommended by my Doctor{ }
My doctor did not refer me to a Physiotherapist { }
Others please specify _____