Compliance to physical activity recommendations amongst type 2 diabetic patients at Thika Level 5 Hospital, Kiambu County, Kenya

Wanyoike, Peter Kamau [1]*, Titus Kahiga[2], Albert Gachau[3]

[1]*Department of Community Health and Epidemiology, Kenyatta University, Kenya*
[2] *Department of Pharmacology and Clinical Pharmacy, Kenyatta University, Kenya*
[3] *Department of Pathology, Kenyatta University, Kenya*

ABSTRACT

Abundant literature supports the beneficial effects of physical activity for improving and maintaining type 2 diabetic patient's glycaemic levels. Patient compliance to lifestyle modifications is difficult to initiate and sustain. Descriptive cross-sectional design was used to study 228 type 2 diabetic patients at Thika Level 5 Hospital. Systematic sampling technique was used. Data was collected using a researcher-administered structured questionnaire. Quantitative data analysis was conducted using SPSS version 25.0 and involved univariate and bivariate analysis. Chi- square were used to test the significance of the association between the dependent and independent variables (p<0.05). The study findings revealed that SE=0.845) and a kurtosis of -0.546(SE=1.741), 55.8% complied with exercise lifestyle recommendations. Employment status (p value=0.045); age (p=0.019) and education (p=0.045) were significantly associated with compliance with exercise. Majority of respondents 207(86.3%) understood that both gentle aerobic exercise and health dietary habits play role in diabetic management. A significant number of female 111(88.1%) and 110(87.3%) and males 99(86.8%) and 99(86.8%) perceived gentle aerobic has role in management of type 2 diabetes and control of sugar respectively. Being/having too busy schedule 129(53.8%) and weather especially during cold seasons 127(52.9%) were cited as most common barriers to complying with exercise. All stakeholders including clinicians, dietitians, health educationists and policy makers should be made aware by providers about the alarmingly high proportion of non-compliance to physical activity advices among diabetic population in Thika. Physical activity advices should be tailored to individual with particular focus on gender, marital status, and socioeconomic status.

Keywords: *Diabetes Mellitus, diabetic patients, dietary habits, physical activity lifestyle.*

1. INTRODUCTION

Diabetes Mellitus is a disorder caused by the total (or relative) absence of insulin, which manifests clinically as an elevated blood glucose [1]. The incidence of diabetes, especially type 2, is rapidly growing in the world. In 1985, an estimated 30 million people suffered with this chronic disease, which, by the end of 2006, had increased to 230 million, representing 6% of the world population [2]. Of this number, 80% is found in the developing world [3]. Glucose is obtained from carbohydrates and its metabolism is controlled by a hormone called insulin which is produced by the beta cells of islets of langerhans of the pancreas and failure to its production leads to diabetes mellitus, [4]

For a long time, Africa was considered safe from many of the diseases that are called "diseases of affluence," which had high incidences in the developed countries. Similarly, there was a time when Africa was thought to be a continent, relatively free of diabetes mellitus illnesses. This has changed significantly in Africa with diabetes becoming a common disease in this continent, this situation remained virtually static till the 1990s [5].

Dietary habits and sedentary lifestyle (inactivity), residence, environmental factors, along with racial and ethnic puzzle of this disease have led experts in this field to posit that a common risk factor may be genetic

predisposition [6]. In Africa, diabetes is common across all the economic class but high among the powerful and wealthy, and therefore it is regarded as diseases of opulence; it remained most prevalent in urban due to sedentary lifestyle, thus they are physically inactive, having diets rich in saturated fats and high sugary beverages. Obesity plays a major role and is a significant contributor to high diabetes prevalence, hence "diabesity [1] in urban and rural areas. In comparison between the two territories, there is high prevalence of obesity in the urban setting.[7] In Africa, in general, the World Health Organization (WHO) estimates that more than one-third of the women are obese compared to one-fourth of the men, with the poor being as vulnerable as the rich.

1.1 Statement of the Problem

The lifestyle diseases have the potential of reducing the country's human resource key to propelling economic growth and therefore the WHO recommends exercise regularly and eat healthy foods; a diet limited in fats and sugars but rich in fruits, vegetables, legumes, whole grains and nuts [8]. Sedentary habits, especially watching TV, are associated with significantly higher risks for obesity and type 2 diabetes. Regular exercise, even of moderate intensity (such as brisk walking), improves insulin sensitivity and may play a significant role in preventing type 2 diabetes regardless of weight loss [9].

2. METHODS

The study design was descriptive cross-sectional. The study was carried out in Thika Level 5 Hospital Kiambu County. The study population was All type 2 diabetic adults on clinical care for more than three months at Thika Level 5 diabetes clinic. Thika Level 5 hospital has daily diabetic clinics for five days in a week that have approximately 60 patients per clinic. A formula was employed to derive a sample size of 228 respondents. The study used systematic sampling methods to achieve required minimum sample size. Data was collected by interviewing respondents using interviewer administered structured questionnaires and analyzed using SPSS version 25, Chi – square statistics and odds ratio were used to test hypothesis. Descriptive statistics was used mainly to summarize the data. SPSS was used for analysing complex data. Data presentation was through the use of pie charts, and frequency tables

3. RESULTS

3.1 Socio-Demographic Characteristics of study respondents

The participants aged less than 18 years were 4(1.7%), aged between 18-29 years 41(17.1%), married (65.4%), majority (38.3%) had secondary school education and a sizeable proportion of the diabetic respondents were self-employed (42.5%) (Table 1).

Table 1: Socio-Demographic Characteristics of study respondents

Variable		Male	Female	Overall
Age (years)	< 18 yrs.	3(75.0%)	1(25.0%)	4(1.7%)
	18-29 yrs.	16(39.0%)	25(61.0%)	41(17.1%)
	30-39 yrs.	36(54.5%)	30(45.5%)	66(27.5%)
	40-49 yrs.	29(58.0%)	21(42.0%)	50(20.8%)
	50-59 yrs.	12(37.5%)	20(62.5%)	32(13.3%)
	>60 yrs.	18(38.3%)	29(61.7%)	47(19.6%)
Marital Status	Single	19(43.2%)	25(56.8%)	44(18.3%)
	Married	84(53.5%)	73(46.5%)	157(65.4%)
	Divorced	5(62.5%)	3(37.5%)	8(3.3%)
	Separated	1(14.3%)	6(85.7%)	7(2.9%)
	Widowed	5(20.8%)	19(79.2%)	24(10.0%)
Education Level	No formal education	2(20.0%)	8(80.0%)	10(4.2%)
	Primary	20(41.7%)	28(58.3%)	48(20.0%)
	Secondary	43(46.7%)	49(53.3%)	92(38.3%)
	College	39(54.2%)	33(45.8%)	72(30.0%)
	University	10(55.6%)	8(44.4%)	18(7.5%)
Employment Status	Unemployed	28(60.9%)	18(39.1%)	46(19.2%)
	Employed	24(55.8%)	19(44.2%)	43(17.9%)
	Self Employed	53(52.0%)	49(48.0%)	102(42.5%)

	Housewife	0(0.0%)	25(100.0%)	25(10.4%)
	Pensioner	9(37.5%)	15(62.5%)	24(10.0%)

3.2 Compliance to Dietary and Physical Activity Modifications

The results indicate that 55.8%) complied with dietary and physical activity lifestyle recommendations as shown in figure 1.

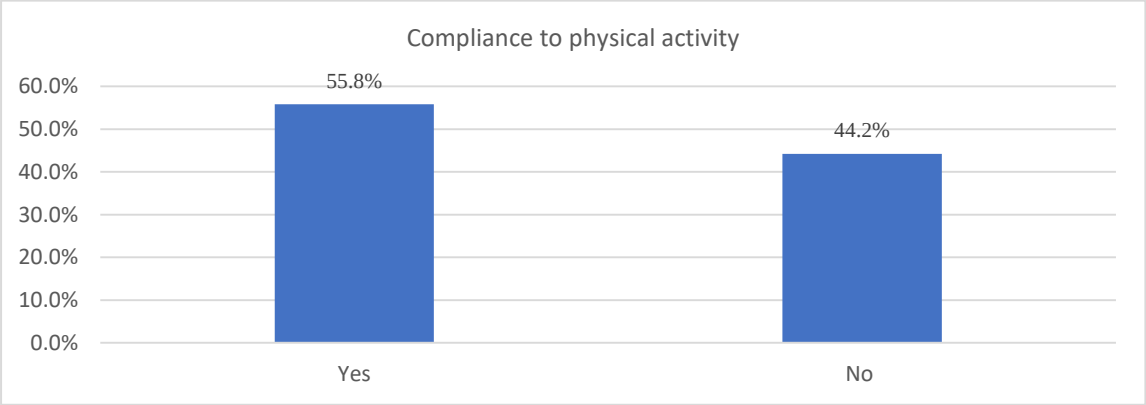


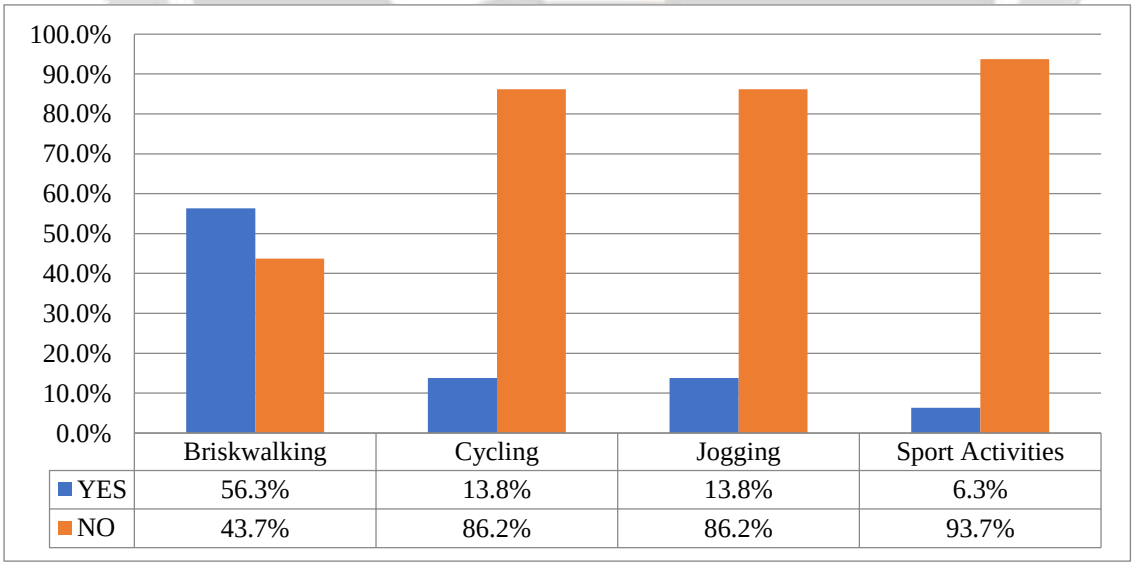
Figure 1: Prevalence of Compliance to Dietary and Physical Activity Modifications

NB: Yes - Depicts compliance to physical activity

No - Depicts non-compliance to physical activity

3.3 Preference of Physical Activity

Among the respondents complying with physical activity recommendations, 56.3% complied with brisk walking, 13.8% with cycling and 6.3% with sport activities as shown in figure 2.



	Briskwalking	Cycling	Jogging	Sport Activities
YES	56.3%	13.8%	13.8%	6.3%
NO	43.7%	86.2%	86.2%	93.7%

Figure 2: Preference of Physical Activity

3.3 Preference of Physical Activity with Outcome

Preference of physical activity and their associated with sugar level was investigated. Variables analysed were compliance to cycling, jogging, sport activities and brisk-walking. Normal level for sugar was 3.5-7.0 mmol/l. Respondents who complied with jogging as physical activity had significant association with controlling sugar level (χ^2=3.013; p=0.045). All the other physical activity had no association with controlling sugar.

Table 1: Preference of Physical Activity with Outcome

	FBS in mmo/l		Statistic
	Normal	Elevated	
Complied with cycling			
Yes	18(54.5%)	15(45.5%)	χ^2 =0.474
No	126(60.9%)	81(39.1%)	df 1 p=0.094
Complied with Jogging			
Yes	19(57.6%)	14(42.4%)	χ^2 =3.013
No	125(60.4%)	82(39.6%)	df 1 p=0.045
Complied with sport activities			
Yes	10(66.7%)	5(33.3%)	χ^2 =2.606
No	132(58.9%)	92(41.1%)	df 1 p=0.087
Complied with brisk-walking			
Yes	76(56.3%)	59(43.7%)	χ^2 =1.764
No	68(64.8%)	37(35.2%)	df 1 p=0.116

3.4 Compliance Rates to Physical Activity among Socio-Demographic Characteristics

Table 3 shows that 45(39.5%) of male, 61(48.4%) of female and 45(50.0%) of respondents with tertiary education were not complying with physical activity. Respondents above 60 years 34(72.3%), married 84(53.5%), pensioner 19(79.2%) and 50(54.3%) of secondary educated respondents complied with physical activity recommendations. Employment status had significant association with compliance to physical activity as a lifestyle modification (p value=0.038); and therefore, fail to accept the null hypothesis and all the other demographic characteristics had no association with compliance to physical activity as a lifestyle modification (p>0.05) thus accept the null hypothesis.

Table 2: Rate of Compliance to Physical Activity among Socio-Demographic Characteristics

	Compliance with physical activity		Statistic
	Yes	No	
Gender			
Male	69(60.5%)	45(39.5%)	χ^2 =1.939
Female	65(51.6%)	61(48.4%)	df 1 p=0.193
Age			
< 30 years	22(48.9%)	23(51.1%)	
30-39 years	31(47.0%)	35(53.0%)	χ^2 =8.821
40-49 years	27(54.0%)	23(46.0%)	df 4
50-59 years	20(62.5%)	12(37.5%)	p=0.066
>60 years	34(72.3%)	13(27.7%)	
Marital Status			
Single	50(60.2%)	33(39.8%)	χ^2 =9.172
Married	84(53.5%)	73(46.5%)	df 1 p=0.057
Employment Status			
Unemployed	35(49.3%)	36(50.7%)	
Employed	20(46.5%)	23(53.5%)	χ^2 =8.414
Self Employed	60(58.8%)	42(41.2%)	df 3
Pensioner	19(79.2%)	5(20.8%)	p=0.038
Education Level			
Primary and below	39(67.2%)	19(32.8%)	χ^2 =4.385
Secondary	50(54.3%)	42(45.7%)	df 2
Tertiary	45(50.0%)	45(50.0%)	p=0.112

3.5 Duration of Physical Activity

Majority of respondents (29.2%) exercised for more than 40 minutes, 25.4% between 10-19 minutes and 20.8% between 30-39 minutes.

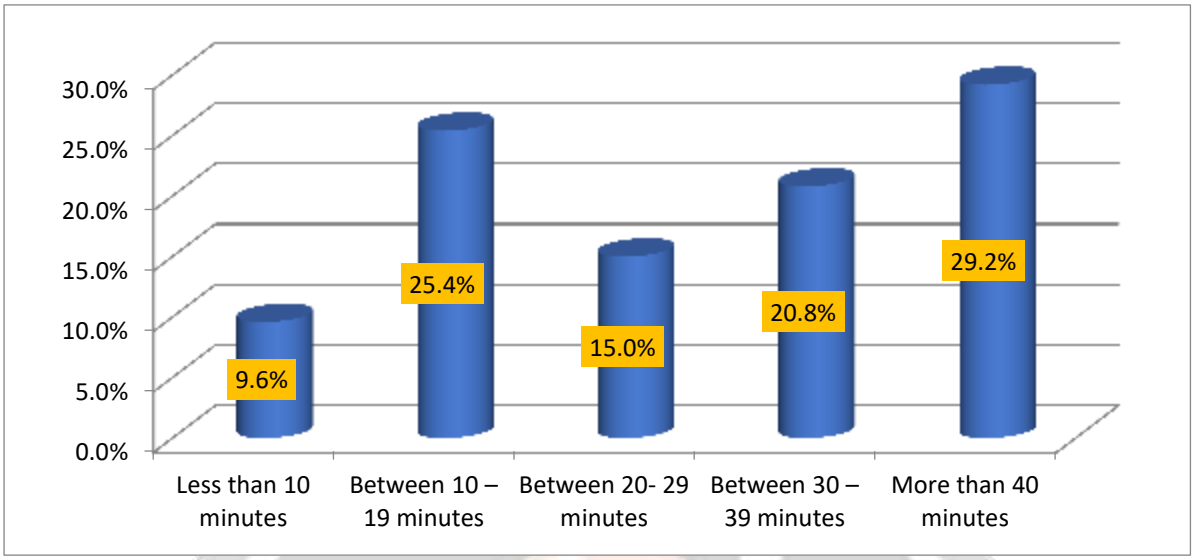


Figure 3: Duration of Physical Activity

3.6 Duration of Physical activity with Sugar Level Outcome

Duration of physical activity was categorized as low intensity (physical activity below 30 minutes per day), moderate intensity (30-39 minutes per day) and vigorous intensity (above 40 minutes per day) as per WHO (2016) guidelines and FBS 3.5-7.0 mmol/l as normal and above 7.0 mmol/l as elevated. All the variables analysed had no significant association with controlling sugar level (χ^2=4.091; p=0.129).

Table 3: Duration of Physical Activity with Sugar Level Outcome

		FBS in mmo/l		
		Normal	**Elevated**	**Statistic**
Duration of physical activity	Low intensity	74(61.7%)	46(38.3%)	χ^2 =4.091
	Moderate intensity	24(48.0%)	26(52.0%)	df 2
	Vigorous intensity	46(65.7%)	24(34.3%)	p=0.129

3.7 Duration of Physical Activity amongst Different Socio-Demographic Characteristics

Duration of physical activity was categorized as low intensity (physical activity below 30 minutes per day), moderate intensity (30-39 minutes per day) and vigorous intensity (above 40 minutes per day) as per WHO (2016) guidelines. Majority of males 50(43.9%), females 70(55.6%), 30-39 years 37(56.1%), married 84(53.5%), tertiary educated 49(54.4%) and employed 27(62.8%) had low intensity physical activity (below recommended 30 minutes for 5 days per week). None of socio-demographic characteristic is significantly associated with how long a physical activity lasted amongst the respondents.

Table 4: Duration of Physical Activity among Socio-Demographic Characteristics

	Duration of physical activity			**Statistic**
	Low Intensity	**Moderate Intensity**	**Vigorous Intensity**	
Gender				
Male	50(43.9%)	25(21.9%)	39(34.2%)	χ^2 =3.657
Female	70(55.6%)	25(19.8%)	31(24.6%)	df 2 p=0.161
Respondents Age				
< 30 years	23(51.1%)	13(28.9%)	9(20.0%)	χ^2 =6.948

30-39 years	37(56.1%)	11(16.7%)	18(27.3%)	4f 4
40-49 years	26(52.0%)	10(20.0%)	14(28.0%)	p=0.542
50-59 years	15(46.9%)	5(15.6%)	12(37.5%)	
>60 years	19(40.4%)	11(23.4%)	17(36.2%)	
Marital Status				
Single	36(43.4%)	19(22.9%)	28(33.7%)	χ^2 =2.280
Married	84(53.5%)	31(19.7%)	42(26.8%)	df 1 p=0.320
Education Level				
Primary and below	25(43.1%)	9(15.5%)	24(41.4%)	χ^2 =6.480
Secondary	46(50.0%)	20(21.7%)	26(28.3%)	df 2
Tertiary	49(54.4%)	21(23.3%)	20(22.2%)	p=0.166
Employment Status				
Unemployed	38(53.5%)	13(18.3%)	20(28.2%)	χ^2 =6.794
Employed	27(62.8%)	7(16.3%)	9(20.9%)	df 3
Self Employed	47(46.1%)	24(23.5%)	31(30.4%)	p=0.067
Pensioner	8(33.3%)	6(25.0%)	10(41.7%)	

3.8 Compliance to Physical Activity Logistic Regression

Investigation of socio-demographic characteristics and association with compliance to physical activity were analysed. Logistic regression results showed there is a significant association between age and education with compliance to physical activity (OR: 0.542; 95% CI: 0.323-0.907; 75 P=0.019) and (OR: 1.88; 95% CI: 1.011-3.497; P=0.045) respectively. There was no significant association marital status (OR: 1.317; 95% CI: 0.767-2.260; P=0.317), employment (OR: 1.070; 95% CI: 0.635-1.803; P=0.799) and gender (OR: 1.439; 95% CI: 0.862-2.403; P=0.164) with compliance to physical activity but singles/separated, unemployed/housewife and males were more likely to comply with physical activity as shown by odds ratio.

Table 5: Compliance to Physical Activity Logistic Regression

	Compliance with physical activity		**OR**	**95% CI**	**p-value**
	Yes	**No**			
Age groups					
< 40 years	53(47.7%)	58(52.3%)	0.542	0.323-0.907	0.019
≥ 40 years	81(62.8%)	48(37.2%)			
Education level					
Primary and below	39(67.2%)	19(32.8%)	1.880	1.011-3.497	0.045
Secondary and above	95(52.2%)	87(47.8%)			
Marital Status					
Single	50(60.2%)	33(39.8%)	1.317	0.767-2.260	0.317
Married	84(53.5%)	73(46.5%)			
Employment					
Unemployed/Pensioner	54(56.8%)	41(43.2%)	1.070	0.635-1.803	0.799
Employed/Self Employed	80(55.2%)	65(44.8%)			
Gender					
Male	69(60.5%)	45(39.5%)	1.439	0.862-2.403	0.164
Female	65(51.6%)	61(48.4%)			

4. CONCLUSION

Compliance to recommended physical activities is important for diabetes management and control of glucose in type 2 diabetic individuals. In this study, majority of the respondents were females, married and aged between 30-39 years. More than three-quarter and slightly above the half of the participants were complying with physical activity recommendations. Respondents who knowledgeable that gentle aerobic control of sugar and gentle aerobic plays role in management of T2DM had strong significant association and were 8 times more likely to comply with exercise recommendations. There was a significant association between age and education on compliance to physical activity. Therefore, there is need to put more effort in exploring patient's background moral, knowledge, behaviour, and emotional supports (from friends, spouse and family), barriers,

ability, and readiness to initiate and wiliness in sustaining recommended lifestyle change that influences patient's compliance to recommended lifestyle modifications. Promoting healthy regular exercises for at least 150 minutes per week and diet can reduces direct health care costs dramatically, improve productivity, prevent burden of the disease and improve type 2 diabetic individual's quality of life. Management of the diabetes mellitus disorders can create a great physical, psychological and socioeconomic burden on the country, society and family; therefore, priority should be given on the preventive aspects of disorders with exercise lifestyle modifications.

5. ACKNOWLEDGEMENTS

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