

Physical Inactivity among Diabetic Patients in Urban Tamilnadu: A Community-Based Study

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Receive date: January 18, 2019; Accepted date: February 15, 2019; Published date: February 28, 2019

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Abstract

Background: The prevalence of diabetes is on the increasing trend in India due to rapid urbanization and lifestyle modification. Physical inactivity plays a major role in increasing insulin sensitivity, thereby improving glycemic control and preventing complications, premature death and disability. But, only 55% of adults in India is physically active and there seems to exist various barriers for physical activity.

Aims: To estimate the prevalence of physical inactivity among the diabetic patients in Thoothukudi Corporation. To identify the barriers for being physically active in the same population.

Materials and methods: Cross sectional study was conducted among diabetic patients of Thoothukudi Corporation. Multi stage sampling method was used. Physical inactivity was assessed using Global Physical Activity Questionnaire (GPAQ) developed by WHO. Barriers to physical activity was assessed using CDC's Barriers to physical activity questionnaire. Data was analyzed using SPSS v.18.

Results: Around 56% of diabetic patients were physically inactive. The prevalence of physical inactivity was significantly associated with gender, marital status, socio-economic class and educational level ($p < 0.05$). Only 33% of them engaged in recreational activities. The study population spent an average of 7 hours per day on sedentary behaviour. The commonly perceived barriers for physical activity were lack of willpower, lack of energy, social influence and lack of time.

Conclusion: More than half of the diabetic patients were physically inactive. Efforts should be made to promote physical activity, especially among women and patients with comorbidities and complications.

Keywords: Diabetes mellitus; Type 2 diabetes; Physical activity; Exercises

Introduction

Diabetes Mellitus is one of the major non-communicable diseases in the world. It is a well-recognised cause for premature death and disability as it increases the risk of vascular, renal, retinal and neuropathic complications. Lifestyle modification, changing dietary habits and rapid urbanization may be the most important factors for the increasing prevalence of this disease.

Globally, there were 425 million diabetic individuals in 2017. In 2045, it has been predicted to increase by 48% giving rise to 629 million diabetics. The prevalence of diabetes was high among the individuals aged 20 to 64 years [1].

India, the second most populous country in the world, has been enormously affected by the global diabetes epidemic. The prevalence of diabetes in India ranges from 5-17%, with higher prevalence in southern part of the country and in urban areas [2-5]. In 2017, India ranked second in diabetes prevalence. The prevalence of diabetes is on increasing trend that India would rank first in the prevalence of diabetes by 2045 [1]. Besides genetic and environmental factors,

population ageing, urbanization, unhealthy lifestyle changes, affluence associated with dietary excess and insufficient physical activity appear to be the potential reasons for the rise in prevalence of diabetes. Low physical activity is one of the modifiable risk factors for diabetes.

Insufficient physical activity is one of the ten leading risk factors for death worldwide. Globally, one in four adults is not active enough. More than 80% of the world's adolescent population is insufficiently physically active [6]. Several studies have emphasized the importance of physical activity among diabetics. It has been demonstrated that increasing physical activity can increase insulin sensitivity and improves glycaemic control among diabetic individuals [7]. It can also potentiate the anti-diabetic treatment providing better glucose tolerance and thereby preventing complications [8].

Unfortunately in India, about 55% of adults are not physically active [9]. Physical inactivity seems to be more prevalent in urban areas [10]. Despite having adequate awareness about physical activity, many of the diabetic patients find barriers for physical activity. Several environmental factors which are linked to urbanization can discourage people from becoming more active, such as fear of violence and crime in outdoor areas, high-density traffic, low air quality and pollution, lack of parks, sidewalks and sports/recreation facilities [6].

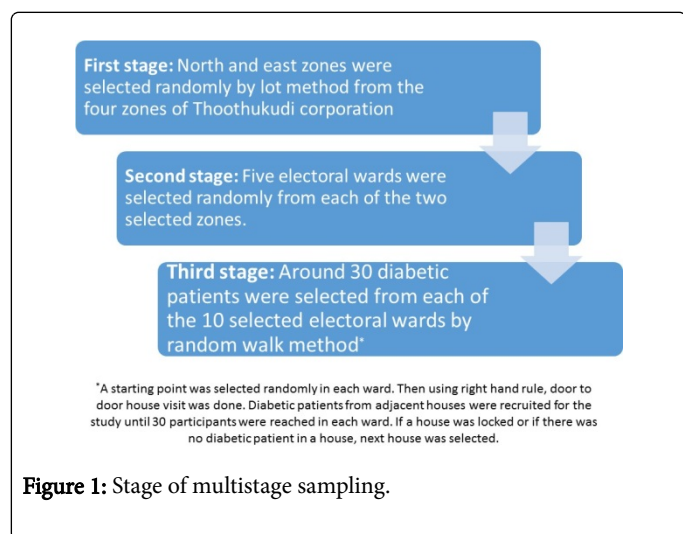
The prevalence of diabetes and impaired glucose tolerance is rapidly increasing in urban areas of Tamilnadu [9]. Studies on physical inactivity among diabetic individuals were also found to be very scarce. Hence, this study was conducted to estimate the prevalence of physical inactivity among the diabetic patients in an urban area of southern Tamilnadu and to identify the barriers for physical activity in the same population.

Objectives

- To estimate the prevalence of physical inactivity among the diabetic patients in Thoothukudi corporation
- To identify the barriers for being physically active in the same population.

Materials and Methods

This study was conducted among diabetic patients in Thoothukudi Corporation as a community based cross sectional study from November 2016 to October 2017. The sample size was calculated based on the prevalence of low physical activity in India which was found to be 23.4% [11]. Considering a confidence level of 95%, absolute precision of 5%, sample size was calculated using the formula $4pq/d^2$. After accounting for 10% non-response rate, the sample size derived was 303. Multistage sampling was used. Sampling steps were explained in the figure 1 below. All diabetic patients of age between 18 years and 64 years except bedridden patients and Gestational Diabetes Mellitus patients were included in the study.



Diabetic patients were selected based on physician diagnosis of diabetes and current use of medications for diabetes (insulin or oral hypoglycaemic agents) and/or fulfilment of criteria laid down by the

WHO Consultation Group Report, i.e., capillary fasting blood glucose ≥ 126 mg/dl or 2 h capillary post-glucose value ≥ 220 mg/dL [12].

The study tool was a self-administered semi-structured questionnaire developed both in Tamil and English. The first part of the questionnaire contained socio-demographic details, anthropometric details and few clinical details, the second part included Global Physical Activity Questionnaire (GPAQ) developed by WHO for measuring the levels of physical activity [13] and the third part included Barriers to physical activity questionnaire from the CDC web site [14].

The GPAQ developed by WHO contained questions on physical activity at work, travel to and from places and recreational activities as well as on sedentary behavior. GPAQ has been found to be valid and reliable in measuring physical activity level in various studies [15-17]. Participants who met WHO recommendations for physical activity at least 150 minutes of moderate-intensity aerobic physical activity throughout the week (or) at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week (or) an equivalent combination of moderate- and vigorous-intensity activity were considered to be physically active [18].

The CDC Barriers to physical activity questionnaire was based on seven categories of barriers namely, lack of time, lack of social influence, lack of energy, lack of resources, lack of willpower, fear of injury and lack of skill. Each of the seven categories was covered by three questions in the questionnaire. A scoring system was used to indicate how likely a person would answer each statement about barriers (very likely=3, somewhat likely=2, somewhat unlikely=1, very unlikely=0). The maximum possible score of one category was 9. A score of 5/9 or above in any category would indicate an important barrier.

Ethical clearance was obtained from the Institutional Ethics Committee. Official permission for the study was obtained from the Commissioner of Thoothukudi Corporation. Informed consent was obtained from the participants before the interview. Participants were explained about the study and show cards were shown to illustrate various moderate and vigorous physical activities. Data was cleaned and analysed using the recommendations of GPAQ analysis guide and software SPSS v.18 [13].

Results

Information was collected from 303 diabetic patients. Out of them, nine were invalidated due to incomplete information or invalid data. Hence, the analysis was done for remaining 294 diabetic individuals. The socio-demographic details of the study population were given in Table 1. More than 50% of the study participants belonged to the age group between 55 and 64 years. Only 3.4% of the participants were illiterate.

Socio-demographic detail		Number of participants (N=294)	Percentage
Age group	25 to 34 years	7	2.5
	35 to 44 years	50	17
	45 to 54 years	82	28
	55 to 64 years	155	52.5

Gender	Male	142	48.3
	Female	152	51.7
Marital status	Married	243	82.7
	Widow	38	12.9
	Widower	13	4.4
Religion	Hindu	235	79.9
	Christian	50	17
	Muslim	9	3.1
Educational status	Illiterate	10	3.4
	Primary or secondary	92	31.3
	High school or higher secondary	107	36.4
	Diploma	14	4.8
	Degree	71	24.1
Socio-economic class	Upper	144	49
	Upper middle	100	34
	Middle	43	14.6
	Lower middle	7	2.4

Table 1: Socio-demographic details of study population.

The prevalence of physical inactivity among the study participants was found to be 55.8%. from Table 2, it can be seen that the prevalence of physical inactivity was significantly associated with gender, marital status, socio-economic class and the participants' educational level ($p < 0.05$).

Socio-demographic details		Number of physically active participants (%)	p-value
Age group	25 to 34 years	2 (28.6%)	0.81
	35 to 44 years	23 (46%)	
	45 to 54 years	36 (44%)	
	55 to 64 years	73 (45.6%)	
Gender	Male	89 (62.7%)	<0.001
	Female	41 (27%)	
Marital status	Married	113 (46.5%)	<0.001
	Widow	7 (18.4%)	
	Widower	10 (76.9%)	
Religion	Christian	22 (44%)	0.466
	Hindu	106 (45.1%)	
	Muslim	2 (22.2%)	
Education	Illiterate	4 (40%)	0.014
	Primary or secondary	29 (31.5%)	

	High school or higher secondary	53 (49.5%)	
	Diploma	7 (50%)	
	UG or PG	41 (57.7%)	
Socio-economic status	Upper	76 (52.8%)	0.018
	Upper middle	44 (44%)	
	Middle	11 (25.6%)	
	Lower middle	3 (42.9%)	

Table 2: Physical inactivity among various groups of study population.

Among the study population 58.5% of them had increased BMI and did not show any significant association with physical activity (p value-0.74). Prevalence of physical activity did not show any significant association with duration of the disease, presence of comorbidities and complications.

Most of the physical activity done by the diabetic patients were moderate intensity physical activity like brisk walking or cycling. The proportion of study population involved in vigorous intensity physical activity was very low (1.5%). Nearly 15% of them engaged in moderate physical activity in the transport domain. On an average, the study population spent only 18 minutes per week on physical activity in transport domain.

Only 33% of them engaged in recreational activities. The proportion of people involving in recreational activities showed a statistically significant relationship with gender, marital status, socioeconomic status and educational status of the study population (p value<0.001). The study population spent an average of 7 hours per day on sedentary behaviour. The commonly perceived barriers for physical activity among the study population are lack of willpower, lack of energy, social influence and lack of time, as shown in Figure 2.

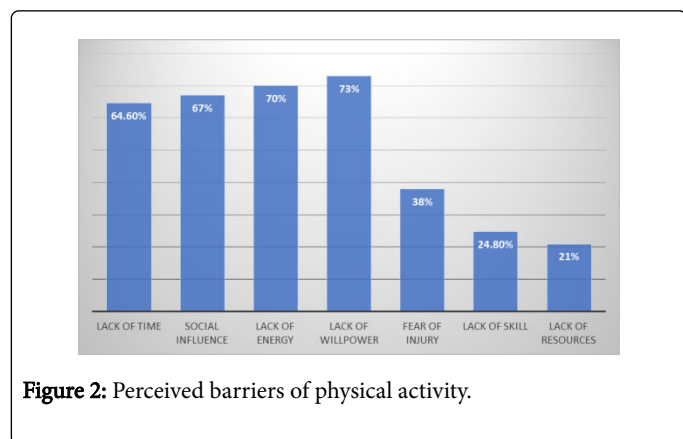


Figure 2: Perceived barriers of physical activity.

Discussion

This study confirms that the level of physical activity is very low among diabetics, with only 44% of the diabetic individuals meeting WHO recommendation for physical activity. World health survey done in 2002 had shown a much lesser prevalence of physical inactivity (9.4%-male and 15.6%-female) [10]. This could be due to the rapidly changing lifestyle and urbanisation of the country over a decade. The

prevalence of physical inactivity among diabetics found in this study is much similar to that found among adults in urban areas [19]. However, the prevalence seems to be lesser than that found by an ICMR-INDIAB multicentric study [18]. It should also be noted that the level of physical activity is declining in rural areas as well [19,20]. The variation in the level of physical activity among different studies can be attributed to the usage of different questionnaires for assessing the physical activity.

This study did not find any significant relationship between physical inactivity and age which is in contrast to many previous studies done among adults [9,10,17,19,21]. Women were found to be highly inactive than men [9,19-21]. A multicentric study done in 11 cities of India had also shown a similar prevalence of physical inactivity male 38.8% and females 46.1% [21]. This reflects the cultural factors prevailing in the country that prevents women from participating in outdoor activities. Also, physical activity of less than 10 minutes duration was not considered by GPAQ assessment. So, most of the physical activities done by women like household chores could have been missed which could also be a reason for the increased prevalence of physical inactivity among women. Special attention to promote physical activity is needed for women and for those with lower socioeconomic status.

As seen in previous studies, this study has also demonstrated a higher level of physical activity in the occupational domain when compared to leisure time and transport domains [9,19,21,22]. When the physical activity levels in the occupational domain decline due to preference to less labour intense jobs, individuals will have to meet their physical activity requirements through their leisure time recreational activities. In this study, the proportion of people involving in recreational or leisure activities were very low as evidenced by a previous study [9]. A study done at rural area in India had also shown a similar pattern [21]. This could be due to limited accessibility and availability of facilities for recreational activities not only in rural areas but also in urban areas. Hence diabetic individuals should be sensitized to improve their leisure time recreational activities.

It is well known that the risk of type 2 diabetes increases with increase in the duration of sedentary behaviour [23,24]. The present study had shown an average of 420 minutes/day of sedentary behaviour. The level of sedentary behaviour was higher among urban population when compared to rural areas [5,22].

Nearly 8% of the study population were not advised for physical activity by their health care providers. The most common type of physical activity recommended by the health care providers were brisk walking (90%), followed by yoga (2%) and fitness exercises (1%). The

most common reason for not doing any physical activity being lack of awareness, lack of time and presence of comorbidities or complications.

Diabetic patients should be advised to indulge in recreational or leisure time activities. Facilities for recreational activities need to be provided both in urban and rural areas. City planning like construction of parks, sidewalks should be done so that it would promote recreational physical activities. Physical activity is one of the primordial modes of preventing diabetes and hence it must be encouraged right from childhood.

One of the limitations of this study was the usage of GPAQ questionnaire for assessing physical activity which was best suitable for population surveillance system [25]. It has been found to be reliable for persons with stable physical activity pattern and unreliable in those with variable physical activity pattern [16]. Translating the questionnaire to local language could have reduced its validity and reliability. Another limitation of this study was underreporting or over reporting of physical activities since GPAQ was mainly based on the self-reported physical activities by the study population. The findings of this study cannot be generalized since it is done in only one urban area of south India.

Conclusion

More than half of the diabetic patients were found to be physically inactive in urban areas. Future research can be done in rural areas to understand the physical activity pattern and its barriers among rural population. Efforts should be made to promote physical activity, especially among women and patients with comorbidities and complications. Recreational physical activities should be encouraged right from schools which could curtail the twin epidemics of diabetes and obesity in India.

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