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Original Research Article

Level of physical activity, determinants and barriers to motivate physical activities among south Indian diabetic patients: a prospective, questionnaire based study

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ABSTRACT

Background: Several clinical trials have been reported that sedentary lifestyle modification including physical activity (PA) and weight loss significantly alters the sort-term as well as long-term incidence of diabetes. The present study explored the level of physical activity and its barriers among south Indian naïve patients who are attending the tertiary care teaching hospital.
Methods: A prospective observational, questionnaire-based study. Patients with diabetes (both Type-1 and 2) who were attended diabetic clinic in the Department of General Medicine, Maharaja Institute of Medical Sciences (MIMS), Vijayanagaram, Andhra Pradesh, India was selected and recruited. Demographic data, clinical data were collected from the study participants. International Physical Activity questionnaire was used to determine each patient level of physical activity (PA). Physical activity is graded into low (<600 metabolic equivalent (MET)), moderate (600-3000 MET) and high (>3000 MET).
Results: A total of 300 subjects were completed the entire study. Majority (62.7%) of the patients were suffering from Type-2 diabetes mellitus. Both male and female study subjects had low physical activity (70.5% and 74.1%) and moderate PA was seen in only one thirds of the patients. Patients with low physical activity had low glycaemic control compared to patients who were involved in moderate PA. Moderate PA patients had adequate glycaemic control (65.9 vs 34.1%, P <0.001). A total of 42.0% of subjects were suffering from one of the joint pains and friction joints, due to the following reason subjects were not involved in the PA.
Conclusions: Low level of physical activity was observed in the study population, which is a risk factor for several micro-vascular complications over a period of time. It is very important to address the barriers of PA and vigorous counselling is needed which directs towards increasing PA.

Keywords: Barriers, Determinants, Diabetes mellitus, Physical activity

INTRODUCTION

Diabetes mellitus is a metabolic disorder and the prevalence of diabetes has been growing rapidly worldwide including developing countries like India. Several clinical trials have been reported that sedentary lifestyle modification including physical activity (PA) and weight loss significantly alters the sort-term as well as long-term incidence of diabetes.[1,2] Moderate intensity physical activity has showed protective beneficial effect

on patients with diabetes, this has been demonstrated by several observational studies and confirmed by meta-analysis.[3]

Mild to moderate intensity of physical activity improves glycemic control in terms of fasting blood glucose levels and glycated haemoglobin (HbA1c). Such beneficial improvement in HbA1c levels in diabetic patients may reduce the long-term micro-vascular complications and improves the risk of cardiovascular diseases, which is the very commonest cause of mortality in patients with diabetes.[4,5] Patients who are suffering diabetes, physical inactivity or complete lack of physical activity is a risk factor for coronary heart disease and 3-4 fold increased risk of mortality with mean follow-up eight years.[6,7]

Moderate physical activity not only decreases the incidence of coronary artery disease and also significantly improves the glycemic control by various cellular mechanisms. These mechanisms may delay the diabetes incidence and its associated clinical micro-vascular complications like retinopathy, nephropathy, neuropathy, peripheral and cardiovascular vascular diseases.[8,9] Lifestyle intervention including mild to moderate regular physical activity significantly reduces the incidence of diabetes as well as psychological components.[10]

With this background the present study explored the level of physical activity and its barriers among south Indian naïve patients who are attending the tertiary care teaching hospital.

METHODS

A prospective observational, questionnaire based study was conducted in the Department of General Medicine, Maharaja Institute of Medical Sciences (MIMS), Vijayanagaram, Andhra Pradesh, India. Study was carried out for a period of one year between February 2018 and February 2019. Study was approved by scientific committee as well as Institutional Ethics Committee. Informed consent was obtained from all of the study participants. Study was conducted according to the Declaration of Helsinki. Patients with diabetes (both Type 1 and 2) who were attended the diabetic clinic during above study period was selected and recruited into the present study. During clinical assessment, data was collected by using predesigned data collection sheet. Demographic data includes age of the patient, gender, weight, height, BMI, level of education, marital status, occupation was collected. Clinical data includes history of comorbid conditions (hypertension, thyroid dysfunction, dyslipidemias, obesity and poly cystic ovarian syndrome (PCOS) etc.,) ongoing medication, age at onset of diabetes, total duration of disease.

International Physical Activity questionnaire was used to determine each patient level of physical activity (PA).[11] Microsoft Excel spread sheet was used for the calculation of metabolic equivalent (MET) and three grades of physical activity of study participants. Physical activity is graded into low (<600 MET), moderate (600-3000 MET) and high (>3000 MET).[12] BMI was graded as normal (18.5-24.9 kg/m^2), overweight (25 to 29.9 kg/m^2), obese (30 to 39.9 kg/m^2) and extremely obese (>40 kg/m^2). Fasting blood glucose levels and HbA1c value were considered as predictive biomarkers to define glycaemic control. HbA1c level is greater than 7% considered as poorly controlled diabetes. A pre-designed questionnaire was provided to study participant and asked them to select the barriers and rank based on their personal life. The questionnaire has options of no time for exercise, no place for exercise, friction joints or joint pain, asthma/IHD/CAD, busy with family, exercise may aggravate the DM, expensive gym, work pressure, fatigue/tiredness/laziness and no barrier.

Sample size was calculated based on the previous studies and pilot study conducted by the same authors, authors assumed that physical inactivity prevalence among study population was 35.0%, 90% power, 5% margin of error and 10% dropout.[13-15] After subtitling the above values, the final study sample size was 300 patients with diabetes mellitus. Data was collected by using data collection sheet and validated questionnaire. All data analysis was carried out in Statistical Package for the Social Sciences (SPSS 25, IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed in mean, standard deviation, frequencies, percentages and proportions. Odd's ratio, its 95% CI and two sided P value was used to find out the PA grades and associated factors. P values <0.05 were considered as statistically significant.

RESULTS

A total of 450 diabetic patients were screened and recruited into the present study. Out of these, a total of 300 subjects were willing to participate and completed the entire study. Demographic details of the study population were showed in Table 1. Male (58.6%) patients were slightly higher than female (41.4%) patients. Nearly 76.6% study participants were fall in the aged between the 41 and 60. A total of 42.6% of study subjects are illiterates, this may be due to fact that the present study was conducted in a tertiary care teaching hospital which mainly covers the surrounding villages nearer to hospital. A total of 89.3% subjects were married and accompanying with spouse//husband. Out of 124 recruited female patients, a total of 119 (96.0%) were housewives. Majority (62.7%) of the patients were suffering from Type-2 diabetes mellitus. Study participants had mean age of 54.6 with12.8 standard deviation. Only 30 subjects were normal BMI, a total of 178 subjects were fall in the obese and 92 were overweight.

Determinants of physical activities among diabetic patients were showed in Table 2. Both male and female study subjects had low physical activity (70.5% and

74.1%) and moderate PA was seen in only one thirds of the patients. Unmarried and others had comparatively better physical activity (25.0% vs 11.2%) compared to married subjects. Illiterates and informal education status subjects had very poor physical activity (90.5%) compared to moderate PA (9.5%). Employees, retired people and housewives had again very high physical inactivity (82.7%, 77.3%) compared to moderate PA which was statistically significant (p<0.001). Compared to the overweight, obese subjects had slightly higher physical inactivity (66.2% vs 60.9%, P=0.08) but not statistically significant. Patients with low physical activity had low glycaemic control compared to patients who were involved in moderate PA. Moderate PA patients had adequate glycaemic control (65.9 vs 34.1%, P <0.001).

Table 1: Demographic details of the study population (N=300).

Category	Number (n)	Percentage (%)
Gender		
Male	176	58.6
Female	124	41.4
Age		
≤40	25	8.3
>41 and <50	110	36.6
≥51 and <60	120	40.0
≥60	45	15.0
Literacy		
Illiterate	128	42.6
Informal education	62	20.6
Schooling	58	19.3
College	52	17.3
Marital status		
Married	268	89.3
Unmarried	10	3.3
Others (Divorced, Widowed)	22	7.3
Occupation		
Employed	89	29.6
Un-employed	09	3.0
Own business	22	7.3
Retired	61	20.3
Housewife	119	39.6
Diabetes mellitus		
Type-1	112	37.3
Type-2	188	62.7
Age (yrs) (mean±SD)	54.6±12.8	-

Dyslipidemias (55.3%) and osteoarthritis/ rheumatoid arthritis/other joint problems (52.0%) were most common comorbid clinical conditions along with diabetes mellitus. Other comorbid conditions were showed in Table 3.

A total of 89.0% of study population prescriptions had polypharmacy. Most of the patients (90.0%) are taking more than three drugs with standard deviation of 1.6.

Table 2: Determinants of physical activities among diabetic patients.

Category	Variable	Low PA (%)	Moderate PA (%)	P-value
Gender	Male	124 (70.5)	52 (29.5)	<0.001
	Female	92 (74.1)	32 (25.9)	
Marital status	Married	238 (88.8)	30 (11.2)	<0.0001
	Unmarried/ others	24 (75.0)	8 (25.0)	
Educational status	Illiterate+ informal education	172 (90.5)	18 (9.5)	<0.001
	Schooling+ college	58 (52.8)	52 (47.2)	P=0.10
Occupation	Employed+ retired	124 (82.7)	26 (17.3)	<0.001
	Housewife	92 (77.3)	27 (22.7)	<0.001
	others	18 (58.0)	13 (42.0)	P=0.06
BMI	Normal	14 (46.7)	16 (53.3)	P=0.06
	Overweight	56 (60.9)	36 (39.1)	<0.001
	Obese	118 (66.2)	60 (33.8)	<0.001
Glycemic control	Poor	161 (73.9)	57 (26.1)	<0.001
	Adequate	28 (34.1)	54 (65.9)	

Table 3: Comorbid conditions and prescription with polypharmacy among diabetics.

Comorbid conditions	Number	Percentage
Thyroid dysfunction	18	6.0
Osteoarthritis/ Rheumatoid arthritis/other joint problems	156	52.0
Bronchial asthma	14	4.6
Hypertension/IHD/CAD	56	18.6
Dyslipidemias	166	55.3
Poly cystic ovarian syndrome (PCOS)	38	12.6
Psychiatric problems	16	5.3
Polypharmacy	267	89.0

Ischemic heart diseases, CAD: Coronary artery disease, DM: Diabetes Mellitus

Various barriers for not involving in physical activity were showed in Table 4. Nearly 98.9% of study participants had selected more than one barrier for physical activity followed by two (85.4%), three (65.4%). A total of 42.0% of subjects were suffering from one of the joint pains and friction joints, due to the following reason subjects were not involved in the PA.

Busy with family (32.6%), Fatigue/tiredness and languor (29.9%), work pressure (22.0%), not sure if exercise is good (12.0%) and no time for exercise (8.6%) was reported by study participants.

Table 4: Various barriers for not involving in physical activity among diabetic study population.

Barriers for physical activities	Number	%
No time for exercise	26	8.6
No place for exercise	12	4.0
Friction joints/joint pain	126	42.0
Asthma/IHD/CAD	21	7.0
Busy with family	98	32.6
Not sure if exercise is good	36	12.0
Exercise may aggravate the DM	09	3.0
Going to Gym is expensive	04	1.3
Work pressure	66	22.0
Fatigue/tiredness	38	12.6
Languor	52	17.3
No barrier for exercise	28	9.3

IHD: Ischemic heart diseases, CAD: Coronary artery disease, DM: Diabetes Mellitus

DISCUSSION

One of the most important barriers which discourage the physical activities were friction joints/joint pains which includes osteoarthritis, rheumatoid arthritis, alkylosing spondylitis, lumbar back pain. Though this was unavoidable, proper counselling with analgesics and anti-inflammatory drugs can be motivate towards physical activity. A total of one third study participants had busy with family and their commitments. Work pressure followed by fatigue, tiredness and languor were barriers towards PA in the present study. A total of 12.0% study subjects not sure whether exercise improves glycaemic control or not. Some participants felt that exercise may aggravate the diabetes mellitus. Nearly 10.0% of subjects did not mention any barrier for exercise and lack of interest was the main barrier to those subjects in the present study. All barriers mentioned above were avoidable, proper and informative counselling may significantly encourage towards PA. Physician or any health care professional willing to spend couple of minutes, we can motivate the diabetic patients.[16-17]

In the present study gender, marital status, educational status occupation, BMI and glycaemic control which includes fasting blood glucose levels and glycated haemoglobin were considered as determinants of physical activities. Diabetic patients with low PA showed poor glycaemic control than moderate PA. It was a well-known fact that patients who are taking anti-diabetic drugs like insulin or oral hypoglycemic drugs need to involve in physical activities for better control of blood glucose levels and prevents insulin resistance. The possible mechanisms which show protective actions of PA were increases metabolism of glucose, transportation of systemic glucose to periphery and decrease insulin resistance.[18-19] Obese diabetic patients had slightly less moderate PA compared to overweight patients, this is possibly due to higher body weight which discourage the PA. Occupation was significantly differs the low PA and moderate PA, but inter occupational status does not show significant difference. Male and female gender also did not show the significant difference, but low PA was seen compared to moderate PA in the present study.

Physical inactivity increases the burden of chronic non-communicable diseases in modern times globally.[20] Meta-analysis proved that PA has positive impact on management of diabetes in both type-1 and type-2 diabetic patients.[21] Healthy volunteers with physical inactivity had positive correlation with hypertension, obesity and diabetic associated micro-vascular complications.[22] Compared to the males, less physical activities were found in female patients with diabetes, this may be due to risk of osteoporosis and accidental falls among pre and post menopause diabetic female patients[23]. A study conducted by Thomas N et. al., reported that Europeans have least interested to perform PA due to greater body mass index, less sensitization, educational status and lower self-rated health.[13]

A number of observational and cohort studies focused on barriers for doing PA in diabetic patients. A study conducted in UK and reported the main barriers were preoccupation in watching television, difficulty in participating in exercise and lack of time and facilities for exercise.[13] Another study conducted in Ireland by Egan AM et al, and find out the barriers they faced which includes lack of time and physical inability to do exercise were main barriers.[24] A study was conducted in a mountainous country, Nepal and reported that cold climate, laziness, lack of time were main barriers for exercise.[25] Another study conducted by Al-Kaabi J et al, in UEA and reported that cultural issues, lack of interest, arthritis, lack of time and family responsibilities were main barriers for PA.[26]

A study conducted on ischemia patients by McCarthy MM et al and reported that PA at baseline and after five years were not statistically significant.[27] A study conducted by Midhet FM et al, and reported that diabetics should be complimented with other component of lifestyle change related to dietary intake, consumption of high calorie diet especially red meat, sweets, dates, fizzy drinks were more common[28]. Even young healthy population had low levels of PA, which was reported by Yammine K et al, in Arab population.[29] Short intervals personal counselling sessions, education towards the importance of physical activities, lifestyle changes and pharmacotherapy adherence may motivate the diabetic patients towards physical activities. Patients who did not have any barrier had showed moderate PA levels among one-fourth diabetic patients, so this is the time where we need to increase the PA levels which in turn reduce the long-term micro-vascular complications. A combined effect should be needed with government and non-government organizations (NGOs) to encourage the general population which motivates the healthy lifestyle by conducted frequent awareness programmes and marathons may increase the PA levels.

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REFERENCES

1. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med. 2002;346(6):393-403.
2. Tuomilehto J, Lindström J, Eriksson JG, Valle TT, Hämäläinen H, Ilanne-Parikka P, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001;344(18):1343-50.
3. Haennel RG, Lemire F. Physical activity to prevent cardiovascular disease. How much is enough? Can Fam Physician Med Fam Can. 2002;48:65-71.
4. Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, et al. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and Diabetes Study. Diab Care. 1997;20(4):537-44.
5. Boulé NG, Haddad E, Kenny GP, Wells GA, Sigal RJ. Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. JAMA. 2001;286(10):1218-27.
6. Berlin JA, Colditz GA. A meta-analysis of physical activity in the prevention of coronary heart disease. Am J Epidemiol. 1990;132(4):612-28.
7. Blair SN, Kohl HW, Paffenbarger RS, Clark DG, Cooper KH, Gibbons LW. Physical fitness and all-cause mortality. A prospective study of healthy men and women. JAMA. 1989;262(17):2395-401.
8. Egede LE, Zheng D. Modifiable cardiovascular risk factors in adults with diabetes: prevalence and missed opportunities for physician counseling. Arch Intern Med. 2002;162(4):427-33.
9. Hamer M, Ingle L, Carroll SP, Stamatakis EA. Physical activity and cardiovascular mortality risk: possible protective mechanisms? Med Sci Sports Exerc. 2012;44(1):84-8.
10. Fox KR. The influence of physical activity on mental well-being. Pub Heal Nutr. 1999;2(3):411-8.
11. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35(8):1381-95.
12. Hagströmer M, Oja P, Sjöström M. The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. Public Health Nutr. 2006;9(6):755-62.
13. Thomas N, Alder E, Leese G. Barriers to physical activity in patients with diabetes. Postgrad Med J. 2004;80(943):287-91.
14. Brazeau A-S, Rabasa-Lhoret R, Strychar I, Mircescu H. Barriers to physical activity among patients with type 1 diabetes. Diab Care. 2008;31(11):2108-9.
15. Dutton GR, Johnson J, Whitehead D, Bodenlos JS, Brantley PJ. Barriers to physical activity among predominantly low-income African- American patients with type 2 diabetes. Diab Care. 2005;28(5):1209-10.
16. Kirk A, Mutrie N, MacIntyre P, Fisher M. Increasing physical activity in people with type 2 diabetes. Diab Care. 2003;26(4):1186-92.
17. Murugesan N, Snehalatha C, Shobhana R, Roglic G, Ramachandran A. Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. Diab Res Clin Pract. 2007;77(3):433-7.
18. Helmrich SP, Ragland DR, Leung RW, Paffenbarger RS. Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus. N Engl J Med. 1991;325(3):147-52.
19. Zheng J, Cheng J, Zheng S, Zhang L, Guo X, Zhang J, et al. Physical Exercise and Its Protective Effects on Diabetic Cardiomyopathy: What Is the Evidence?. Front Endocrinol (Lausanne). 2018;9:729.
20. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, et al. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet Lond Engl. 2012;380(9838):219-29.
21. Yuing Farias T, Santos-Lozano A, Solís Urra P, Cristi-Montero C. Effects of training and detraining on glycosylated haemoglobin, glycaemia and lipid profile in type-ii diabetics. Nutr Hosp. 2015;32(4):1729-34.
22. Livingstone KM, McNaughton SA. A health behavior score is associated with hypertension and obesity among Australian adults. Obes Silver Spring Md. 2017;25(9):1610-7.
23. Romana M, Li-Yu JT. Investigation of the relationship between type 2 diabetes and osteoporosis using Bayesian inference. J Clin Densitom. 2007;10(4):386-90.
24. Egan AM, Mahmood W a. W, Fenton R, Redziniak N, Kyaw Tun T, Sreenan S, et al. Barriers to exercise in obese patients with type 2 diabetes. QJM Mon J Assoc Physicians. 2013;106(7):635-8.
25. Ghimire S. Barriers to diet and exercise among Nepalese type 2 diabetic patients. Int Sch Res Not. 2017;2017:1273084.
26. Al-Kaabi J, Al-Maskari F, Saadi H, Afandi B, Parkar H, Nagelkerke N. Physical activity and reported barriers to activity among type 2 diabetic

patients in the United arab emirates. Rev Diab Stud RDS. 2009;6(4):271-8.
27. McCarthy MM, Davey J, Wackers FJT, Chyun DA. Predictors of physical inactivity in men and women with type 2 diabetes from the Detection of Ischemia in Asymptomatic Diabetics (DIAD) study. Diabetes Educ. 2014;40(5):678-87.
28. Midhet FM, Al-Mohaimeed AA, Sharaf FK. Lifestyle related risk factors of type 2 diabetes mellitus in Saudi Arabia. Saudi Med J. 2010;31(7):768-74.
29. Yammine K. The prevalence of physical activity among the young population of UAE: a meta-analysis. Perspect Public Health. 2017;137(5):275-80.

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