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ORIGINAL ARTICLE

Physical activity behaviour in people with diabetes residing in India: A cross-sectional analysis



Comportement de l'activité physique chez les personnes diabétiques résidant en Inde : une analyse transversale

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KEYWORDS

Physical exercise;
Barriers;
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Summary

Aim. – To describe and analyse physical activity behaviour and barriers and facilitators, in adults with diabetes residing in India.

Methods. – The sample consisted of 190 (110 men and 80 women) adults with diabetes living in India. The mean age of the sample was 57 years (18 to 83 years), and the mean duration since diagnosis of diabetes was 10.38 years (SD 8.41 years). All participants completed a questionnaire about their physical activity behaviour, importance of, and barriers and facilitators.

Results. – In all, 78.9% of participants thought that physical activity was important in the control of diabetes. In all, 54.7% of respondents did regular physical activity every week, and physical activity was more frequent in men (63.6%), and in those with an intermediate (60%) or advanced (65.2%) level of English. Barriers that discouraged participants from physical activity were lack of time (31.6%), lack of knowledge (23.2%) and health limitations (17.4%). Potential identified facilitators included more information about physical activity (39%) and group exercise with people of the same sex or speaking the same language.

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MOTS CLÉS

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Conclusions. – Most of the sample thought that physical activity is important to control diabetes, although few participated in regular physical activity. Findings also suggest that physical activity had a higher importance for men, for those with an advanced level of English and those under 60 years of age. Men, those with intermediate or advanced level of English, and people under 60 years were significantly more active.

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Résumé

Objectif. – Décrire et analyser les niveaux, les barrières et les facilitateurs de l'activité physique chez les adultes diabétiques résidant en Inde.

Méthodes. – L'échantillon était constitué de 190 adultes (110 hommes et 80 femmes) atteints de diabète vivant en Inde. L'âge moyen de l'échantillon était de 57 ans (18 à 83 ans) et la durée moyenne du diagnostic de diabète était de 10,38 ans (écart-type de 8,41 ans). Tous les participants ont rempli un questionnaire sur leur niveau, leur importance, les obstacles et les facilitateurs pour l'activité physique.

Résultats. – Au total, 78,9 % des participants pensaient que l'activité physique était importante dans le contrôle du diabète. Au total, 54,7 % des répondants faisaient de l'activité physique régulièrement chaque semaine, et l'activité physique était plus fréquente chez les hommes (63,6 %) et chez ceux ayant un niveau d'anglais intermédiaire (60 %) ou avancé (65,2 %). Les obstacles qui décourageaient les participants à l'activité physique étaient le manque de temps (31,6 %), le manque de connaissances (23,2 %) et les limitations en matière de santé (17,4 %). Les facilitateurs potentiels identifiés comprenaient plus d'informations sur l'activité physique (39 %) et des exercices de groupe avec des personnes du même sexe ou qui parlent la même langue.

Conclusions. – La majorité de l'échantillon pensait que l'activité physique est importante pour contrôler le diabète, même si peu d'entre eux participaient à une activité physique régulière. Les résultats suggèrent également que l'activité physique a une plus grande importance pour les hommes, pour ceux qui ont un niveau d'anglais avancé et ceux de moins de 60 ans. Les hommes, ceux qui ont un niveau d'anglais intermédiaire ou avancé et les personnes de moins de 60 ans étaient significativement plus actifs.

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1. Introduction

India has one of the highest prevalence of diabetes mellitus in the world ($n \geq 62$ million) [1]. It is predicted that by 2030 79.4 million individuals residing in India will suffer from the condition [1]. The prevention and good management of diabetes to reduce complications is thus of paramount importance. Indeed, several studies have underlined the central role of physical activity in the management of type 1 or type 2 diabetes [2,3]. In those with diabetes physical activity has been shown to improve glycemic control, insulin sensitivity, and restore diabetes associated complications (cardiovascular disease and retinopathy) [4]. However, despite such knowledge, diabetes-related vascular complications and other factors often discourage participation in physical activity [3].

Even though evidence points to the positive improvements associated with physical activity in diabetes management, studies have reported a low prevalence of physical activity in those with diabetes, with some studies reporting that only 10% of people participate [5]. One explanation may be that few physicians prescribe physical

activity as a therapy for diabetes because there is a lack of information on how to implement such therapies [3]. In light of this knowledge, physical activity guidelines have been developed for people with diabetes [6]. These practice guidelines recommend that people with diabetes obtain at least 150 minutes of moderate to vigorous physical activity (MVPA) per week. It is also necessary to highlight that resistance training is important, that doing small amounts of physical activity can be better than doing none, and that it is important to reduce time spent being sedentary [6–8]. Furthermore, the position statement of the American Diabetes Association about physical activity and diabetes [9] should be taken into consideration. This statement offers detailed recommendations of physical activity for people with diabetes similar to those stated above. Interventions targeting physical activity promotion in populations with diabetes are therefore needed. However, before this is implemented, it is important to know the levels of physical activity for whom the intervention is to be designed, and if possible explore barriers that are associated with the current levels of activity. A recent review investigated barriers of physical activity in those with diabetes mellitus. The most

commonly reported barriers were time constraints, fear of provoking additional disorders, exercise venue and weather-related barriers. The review concluded that additional data is needed to better understand physical activity behaviours [10]. One study not included in the aforementioned review interviewed 28 participants with type 2 diabetes on barriers and facilitators to physical activity participation; four main themes were identified:

- the body as a barrier to physical activity because of functional limitations;
- logistical challenges, including lack of time and awareness of where to exercise in the local area;
- being physically active with others, providing a sense of mutual commitment and enjoyment may facilitate physical activity;
- goal-setting and self-tracking may also facilitate physical activity [11].

At present, there is a paucity of studies exploring physical activity behaviour in those with diabetes residing in India, as well as barriers of, and facilitators to, physical activity in this population. Such information is necessary to aid in the development of a targeted physical activity promotion strategy for this sample. The aims of the present study are to:

- describe physical activity behaviour;
- as well as barriers of and facilitators to physical activity, in a sample of adults with diabetes residing in India.

2. Methods

2.1. Participants

A total of 190 consecutive (110 men and 80 women) adults with type 1 or type 2 diabetes attending a diabetic eye clinic in Sankara Nethralya Eye Hospital in Chennai, India, were recruited into the study. Large inclusion criteria were applied to facilitate recruitment. Participants were asked by an optometrist if they would like to take part in the present study. If the participant agreed they were then asked to give informed consent. The mean age of the sample was 57.11 years (SD 11.54; range 18–83). The number of participants under 60 years was 108 (56.8%) and over 60 years 82. The mean duration from diabetes diagnosis was 10.38 years (SD 8.41), with 90 people (48.1%) with less than 10 years since diagnosis of diabetes and 97 with more than 10 years. A total of 183 (96.3%) were married and 7 (3.7%) were single. A total of 56 (29.5%) participants had a basic level of English, 65 (34.2%) an intermediate level and 69 (36.3%) an advanced level.

2.2. Procedure

Participants reported their sex, age, marital status, level of spoken and written English (a proxy for socioeconomic-status), and years since diabetes diagnosis. A detailed questionnaire was administered by two qualified optometrists. All the data were self-reported. Regular physical activity was defined according to the World Health

Organisation's global physical activity recommendations (i.e., at least 150 minutes of moderate-intensity aerobic physical activity throughout the week). Participants were asked (i) Do you think regular physical exercise is important for good control of diabetes? Response options were 'yes/no/don't know', (ii) Do you do regular physical exercise every week e.g. fast walking, jogging, cycling, swimming? Response options were 'yes/sometimes every week/no', (iii) Do you think this is enough exercise to control your diabetes? Response options were 'yes/no', (iv) If you don't exercise at all or exercise for a very short time, what discourages you from exercising? Open text response (coded; 1. Lack of time. 2. Lack of knowledge. 3. Lack of interest. 4. Fear. 5. People with diabetes should not exercise. 6. Health limitations. 7. Others); (v) What do you think can be done to help you do regular physical exercise? Open text response (coded; 1. Information. 2. Group exercise. 3. Others). Ethical approval was granted by the Sankara Nethralaya review board.

2.3. Data analysis

Descriptive statistics were used to describe demographic characteristics of the study population. Frequency data were calculated to describe importance of physical activity for the participants, physical activity behaviour (i.e., do you do regular physical exercise every week), and barriers and facilitators to physical activity. Chi-squared analyses were employed to proportions to determine differences. Alpha was set at 0.05. Analyses were carried out in the Statistical Package for Social Science (SPSS), version 23.

3. Results

A total of 78.9% ($n = 150$) of the sample thought that physical activity was important to control diabetes, 13.2% ($n = 25$) believed that physical activity was not important and 7.9% ($n = 15$) reported that they do not know. When the sample was stratified by sex, more men (81.8%, $n = 90$) than women (75%, $n = 60$) believed that physical activity was important. When stratifying the sample by level of spoken and written English, physical activity was thought to be more important for those with an advanced (91.3%, $n = 63$) or intermediate (80.0%, $n = 52$) level than for those with a basic level (62.5%, $n = 35$). There were more people under 60 years (82.4%, $n = 89$) than over 60 who thought that physical activity was important for the control of diabetes. However, no significant differences were found by years of diabetes since diagnosis (Table 1).

Greater than half of the sample (54.7%; $n = 104$) reported participating in regular physical activity every week, however there was also a considerable proportion reporting physical activity only sometimes (21.1%, $n = 40$), and never (24.2%, $n = 46$). Men were significantly ($P < .05$) more active than women, 63.6% ($n = 70$) of men and 42.5% ($n = 34$) of women reported participating in regular activity every week. Those with a basic level of written and spoken English reported less physical activity than those with an intermediate or advance levels ($P < .05$). Those under 60 years reported doing more physical activity than those over 60 years, significant differences ($P < .05$) were found between

Table 1 Do you think regular physical exercise is important for good control of diabetes?

	1. Yes	2. No	3. Do not know
	No. (%)	No. (%)	No. (%)
Total sample (n = 190)	150 (78.9) ^{2,3}	25 (13.2) ¹	15 (7.9) ¹
Sex			
(a) Men (n = 110)	90 (81.8) ^{2,3}	13 (11.8) ¹	7 (6.4) ¹
(b) Women (n = 80)	60 (75.0) ^{2,3}	12 (15.0) ¹	8 (10.0) ¹
Marital status			
(a) Married (n = 183)	145 (79.2) ^{2,3}	23 (12.6) ¹	15 (8.2) ¹
(b) Single (n = 7)	5 (71.4)	2 (28.6)	—
English level			
(a) Basic (n = 56)	35 (62.5) ^{2,3,b,c}	14 (25.0) ^{1,b,c}	7 (12.5) ^{1,c}
(b) Intermediate (n = 65)	52 (80.0) ^{2,3,a}	6 (9.2) ^{1,a}	7 (10.8) ^{1,c}
(c) Advanced (n = 69)	63 (91.3) ^{2,a}	5 (7.2) ^{1,a}	1 (1.4) ^{1,a,b}
Age			
(a) < 60 (n = 108)	89 (82.4) ^{2,3}	14 (13.0) ^{1,3}	5 (4.6) ^{1,2}
(b) > 60 (n = 82)	61 (74.4) ^{2,3}	11 (13.4) ¹	10 (12.2) ¹
Years since diagnosis of diabetes			
(a) < 10 (n = 90)	72 (80.0) ^{2,3}	11 (12.2) ¹	7 (7.8) ¹
(b) > 10 (n = 97)	76 (78.4) ^{2,3}	13 (13.4) ¹	8 (8.2) ¹

Superscripts indicate the significant differences ($P < .05$) found between categories with the chi-squared analyses. Superscripts can be read horizontally and vertically. For example, for the variable sex, it should be read that there is a significant difference between 1 with 2 and 3 for both men and women. There are no significant differences between men and women responses.

Table 2 Do you do regular physical exercise every week e.g. fast walking, jogging, cycling, swimming?

	1. Yes	2. Sometimes every week	3. No
	No. (%)	No. (%)	No. (%)
Total sample (n = 190)	104 (54.7) ^{2,3}	40 (21.1) ¹	46 (24.2) ¹
Sex			
(a) Men (n = 110)	70 (63.6) ^{2,3,b}	22 (20.0) ¹	18 (16.4) ^{1,b}
(b) Women (n = 80)	34 (42.5) ^{2,a}	18 (22.5) ¹	28 (35.0) ^a
Marital status			
(a) Married (n = 183)	100 (54.6) ^{2,3}	39 (21.3) ¹	44 (24.0) ¹
(b) Single (n = 7)	4 (57.1)	1 (14.3)	2 (28.6)
English level			
(a) Basic (n = 56)	20 (35.7) ^{b,c}	14 (25.0)	22 (39.3) ^{b,c}
(b) Intermediate (n = 65)	39 (60.0) ^{2,3,a}	14 (21.5) ¹	12 (18.5) ^{1,a}
(c) Advanced (n = 69)	45 (65.2) ^{2,3,a}	12 (17.4) ¹	12 (17.4) ^{1,a}
Age			
(a) < 60 (n = 108)	58 (53.7) ^{2,3}	31 (28.7) ^{1,b}	19 (17.6) ^{1,b}
(b) > 60 (n = 82)	46 (56.1) ^{2,3}	9 (11.0) ^{1,3,a}	27 (32.9) ^{1,2,a}
Years since diagnosis of diabetes			
(a) < 10 (n = 90)	47 (52.2) ^{2,3}	21 (23.3) ¹	22 (24.4) ¹
(b) > 10 (n = 97)	55 (56.7) ^{2,3}	19 (19.6) ¹	23 (23.7) ¹

Superscripts indicate the significant differences ($P < .05$) found between categories with the chi-squared analyses. Superscripts can be read horizontally and vertically. For example, the variable sex should be read that there is a significant difference between men for 1 and 2,3; there is a significant difference between women for 1 and 2; there is a significant difference between men and women for responses 1 and 3.

those who do physical activity sometimes and those who never do physical activity. No significant differences were found when stratifying by years since diagnosis of diabetes (Table 2).

A total of 45.3% ($n = 86$) of participants did not think they do enough physical activity to control their diabetes, men

(42.7%, $n = 47$) and women (48.8%, $n = 39$). There were significant differences ($P < .05$) in reported physical activity behaviour between those with basic and advanced levels of written and spoken English, with higher activity behaviour for those with advanced levels. According to age and years since diabetes diagnosis, there were more people under 60

Table 3 Do you think this is enough exercise to control your diabetes?

	1. Yes	2. No
	No. (%)	No. (%)
Total sample (<i>n</i> = 190)	104 (54.7)	86 (45.3)
Sex		
(a) Men (<i>n</i> = 110)	63 (57.3)	47 (42.7)
(b) Women (<i>n</i> = 80)	41 (51.2)	39 (48.8)
Marital status		
(a) Married (<i>n</i> = 183)	99 (54.1)	84 (45.9)
(b) Single (<i>n</i> = 7)	5 (71.4)	2 (28.6)
English level		
(a) Basic (<i>n</i> = 56)	24 (42.9) ^c	32 (57.1) ^c
(b) Intermediate (<i>n</i> = 65)	38 (58.5)	27 (41.5)
(c) Advanced (<i>n</i> = 69)	42 (60.9) ^a	27 (39.1) ^a
Age		
(a) < 60 (<i>n</i> = 108)	62 (57.4)	46 (42.6)
(b) > 60 (<i>n</i> = 82)	42 (51.2)	40 (48.8)
Years since diagnosis of diabetes		
(a) < 10 (<i>n</i> = 90)	51 (56.7)	39 (43.3)
(b) > 10 (<i>n</i> = 97)	51 (52.6)	46 (47.4)

Significant differences ($P < .05$): Indicated by superscripts.

years and with less than 10 years since diagnosis who thought that they do enough physical activity, although these differences were not significant (Table 3).

Reasons that discouraged the sample from physical activity are detailed in Table 4. Common themes included lack of time (31.6%, $n = 60$), lack of knowledge (23.2%, $n = 44$) and health limitations (17.4%, $n = 33$). Reasons were similar for men and women, although for women health limitations were more important. A common barrier for those with an intermediate level of English was lack of knowledge about the right kind of exercise. Health limitations was an important barrier for people under 60 years, and interestingly, for people diagnosed with diabetes for less than 10 years.

Reported possible facilitators to increase the level of physical activity are described in Table 5. A total of 39% ($n = 74$) of participants reported that more information about physical activity would aid in being physically active, this was reported by more people with advanced levels of English. In addition, for 27.5% ($n = 22$) of women, group exercise was an important facilitator to physical activity. Information and group exercise were more important for participants under 60 years, while most of the people over 60 years pointed out other reasons such as having sport facilities and gyms adapted to their needs, encouragement from family members and motivation. Finally, in this case, there are practically no differences when the sample is stratified by years since diabetes diagnosis.

4. Discussion

Most participants in the present study (78.9%) thought that physical activity was important to control diabetes. Physical activity in the control of diabetes was thought to be more important for men (81.8%), for those with an advanced level of written and spoken English (91.3%) and for those under 60

years (82.4%). Moreover, more than half of the respondents (54.7%) did regular physical activity every week, and regular physical activity was more frequent in men (63.6%) and in those with intermediate (60%) or advanced (65.2%) levels of written and spoken English.

Our findings add to and support previous literature carried out in populations of people with diabetes residing in other locations, relating to the awareness of physical activity benefits. For example, Brassill et al. (2010) [12] found in a sample of 115 people with diabetes residing in Ireland that 90% reported an awareness of the benefits of exercise in diabetes control. These data suggest that those with diabetes are indeed aware of the benefits of physical activity yet this awareness does not seem to translate into a high prevalence of physical activity. Specific interventions are warranted into translating this awareness into practice to aid in the maintenance of this growing epidemic in India.

Our findings both support and contradict previous literature on levels of physical activity in those with diabetes. Fowles et al. [13], carried out a study in 180 adults at 8 diabetes centres in Canada, and found that approximately 32% of the sample reported accumulating at least 150 minutes of MVPA per week. Moreover, Kummel et al. [14], carried out a study in a sample of 225 people with diabetes residing in Brazil and 37.8% of the sample reported exercising regularly. Findings from the present study suggest that a higher proportion (55%) of those with diabetes take part in regular activity. Other studies using self-report have found similar findings to the present analyses. For example, in a sample of adults residing in the USA with type 2 diabetes ($n = 75$) Erickson [15], found that 21.3% exercised 2 days or fewer, 32% exercised 3 to 5 days, and 46.7% exercised 6 or 7 days per week. Differences between studies may be explained by the social and political context of the countries studied or differences between self-report measurements of physical activity, as well as difference between self-report and objective means, but likely a combination of all.

In the present study, the most important reasons that discouraged physical activity were lack of time (31.6%), lack of knowledge of physical activity (23.2%) and health limitations (17.4%). A high number of participants (39%) reported that more information on physical activity would likely aid in regular participation, and 27.5% of women reported group exercise with people of the same sex or speaking the same language would improve participation. We encourage future interventions to promote physical activity in this population to target such variables. Interestingly, similar variables have been reported as barriers and facilitators to physical activity participation in populations of other non-communicable diseases [16]. Additional non-clinical intervention is needed to develop social support strategies that will increase physical activity engagement in the present population, in addition to providing information on how to be physically active. It is feasible that a physical activity recommendation (thus providing people with diabetes with more information) from a health professional could influence behaviour. Receiving a plan of how to increase physical activity within the primary care has been shown to increase physical activity levels in inactive adults [17].

A key finding of the present study is that, although most of the sample think that physical activity is important to control diabetes, few participate in regular physical

Table 4 If you don't exercise at all or exercise for a very short time, what discourages you from exercising?

	1. Lack of time	2. Lack of knowledge	3. Lack of interest	4. Fear	5. People with diabetes should not exercise	6. Health limitations	7. Others
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Total sample (n = 190)	60 (31.6)	44 (23.2)	10 (5.3)	7 (3.7)	15 (7.9)	33 (17.4)	75 (39.5)
Sex							
Men (n = 110)	35 (31.8)	27 (24.5)	7 (6.4)	3 (2.7)	10 (9.1)	14 (12.7)	48 (43.6)
Women (n = 80)	25 (31.3)	17 (21.3)	3 (3.8)	4 (5.0)	5 (6.3)	19 (23.8)	27 (33.8)
Marital status							
Married (n = 183)	56 (30.6)	41 (22.4)	9 (4.9)	7 (3.8)	4 (2.2)	29 (15.8)	73 (39.9)
Single (n = 7)	4 (57.1)	3 (21.4)	1 (14.2)	-	2 (28.6)	4 (57.1)	2 (28.6)
English level							
Basic (n = 56)	19 (33.9)	11 (19.6)	2 (3.6)	5 (8.9)	1 (1.8)	8 (14.2)	21 (37.5)
Intermediate (n = 65)	16 (24.6)	17 (26.2)	6 (9.2)	1 (1.5)	9 (13.8)	12 (18.5)	25 (38.5)
Advanced (n = 69)	25 (36.2)	16 (23.2)	2 (2.9)	1 (1.5)	5 (7.2)	13 (18.8)	29 (42.0)
Age							
< 60 (n = 108)	41 (38.0)	30 (27.8)	7 (6.5)	6 (5.6)	9 (8.3)	21 (19.4)	36 (33.3)
> 60 (n = 82)	19 (23.2)	14 (17.1)	3 (3.7)	1 (1.2)	6 (7.3)	12 (14.6)	39 (47.6)
Years since diagnosis of diabetes							
< 10 (n = 90)	31 (34.4)	21 (23.3)	8 (8.9)	4 (4.4)	8 (8.9)	22 (24.4)	32 (35.6)
> 10 (n = 97)	28 (28.9)	21 (21.7)	2 (2.1)	3 (3.1)	7 (7.2)	11 (11.3)	43 (44.3)

Table 5 What do you think can be done to help you do regular physical exercise?

	1. Information	2. Group exercise	3. Others
	No. (%)	No. (%)	No. (%)
Total sample (n = 190)	74 (39.0)	46 (24.2)	73 (38.4)
Sex			
Men (n = 110)	46 (41.8)	24 (12.6)	45 (23.7)
Women (n = 80)	28 (35.0)	22 (27.5)	28 (35.0)
Marital status			
Married (n = 183)	70 (38.3)	42 (22.9)	71 (38.8)
Single (n = 7)	4 (57.1)	4 (57.1)	2 (28.6)
English level			
Basic (n = 56)	19 (33.9)	13 (23.2)	23 (41.1)
Intermediate (n = 65)	24 (36.9)	14 (21.5)	25 (38.5)
Advanced (n = 69)	31 (44.9)	19 (27.5)	25 (36.2)
Age			
< 60 (n = 108)	47 (43.5)	32 (29.6)	32 (29.6)
> 60 (n = 82)	27 (32.9)	14 (17.1)	41 (50.0)
Years since diagnosis of diabetes			
< 10 (n = 90)	35 (38.9)	21 (23.3)	37 (41.1)
> 10 (n = 97)	38 (39.2)	24 (24.7)	36 (37.1)

activity. Physical activity is more frequent in men, in those with a higher level of written and spoken English and under 60 years of age. This is in alignment with findings from previous literature [18,19]. Interventions to promote physical activity levels in this population should be demographic – specific with different activity plans to promote activities in women, those with a low level of written and spoken English and older.

Literature from non-Indian populations has identified potential intervention components that could be targeted/utilised to promote physical activity in those with diabetes. A recent review on the impact of accelerometer and pedometer use on physical activity and glycaemic control in people with type 2 diabetes identified 12 trials of which nine studied pedometers and three accelerometers. Random-effects meta-analysis showed an overall increase in physical activity (standardized mean difference 0.57, 95% CI 0.24, 0.91) in the intervention groups. Accelerometers and pedometers produced a similar effect size [20]. Another review of physical activity and diet interventions in those with type 2 diabetes identified 4 behaviour change techniques that were associated with reductions in HBA1c: ‘instruction on how to perform a behaviour’, ‘behavioural practice/rehearsal’, ‘demonstration of the behaviour’ and ‘action planning’, as were intervention features ‘supervised physical activity’, ‘group sessions’, and ‘contact with an exercise physiologist’ [21]. In addition to the findings in the present study, interventions to promote physical activity in this population should also consider using activity monitors.

A clear strength of the present paper is the sample of adults with diabetes residing in India. However, the study is not without limitations. The measure of physical activity has not been validated and the data are self-reported, although similar measures have been used previously in clinics for measuring physical activity. The data are collected from people attending an eye clinic which may bias the observations reported in this study. It is possible, that in the community, the data may show a different profile.

Finally, the present study is of a cross-sectional design meaning direction of associations cannot be established. Future studies (thus research challenges) in this population should measure physical activity using objective monitors such as Actigraph accelerometers and should utilise a longitudinal design to aid in inference of causation.

5. Conclusions

Findings from this study suggest to implement physical activity intervention programs in India that target women with diabetes, with a low level of English and over 60 years.

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Disclosure of interest

The authors declare that they have no competing interest.

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