

Diabetes Self-Management Behaviours among Adult Persons with Disabilities – A Systematic Review

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ABSTRACT

Background: Self-management of diabetes is essential for proper control of blood sugars and prevention of complications. Persons with disabilities face challenges in adopting self-management behaviours. Objectives: To assess diabetes self-management behaviours among persons with disabilities. **Materials and Methods:** We searched PubMed with a comprehensive search strategy to retrieve epidemiological studies that reported the diabetes self-management behaviours among persons with disabilities in English language journals between 1990 – 2022. We did a step-wise screening of the retrieved articles and synthesized the findings of the selected papers. **Results:** Of the 992 papers that were obtained, 981 did not meet our inclusion criteria and were excluded at the stage of title and abstract screening. Eleven papers were retrieved and read in detail, and 8 of them were excluded at this stage. Finally, three papers two from China and one from Iran were included in the review. The studies revealed poor diabetes self-management behaviours among persons with disabilities, especially in the domains of diet and physical activity. **Conclusion:** There is a dearth of studies exploring diabetes self-management behaviours among persons with disabilities. Even the few reported studies show low levels of self-management behaviours.

Keywords: Diabetes self-management, Disabilities, Glycemic control, Diet, Exercise, Monitoring, Medication adherence.

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INTRODUCTION

About 16% of the global population experiences some or the other form of disability.¹ People with disabilities are at a greater risk of developing chronic diseases such as diabetes mellitus. There is a strong association between physical disability and increased incidence of type 2 diabetes.² A study done in Korea reported that the prevalence of diabetes among people with disability is about 23%.² Another study done among the Dutch population, found a diabetes prevalence of 9.9% among people with intellectual disabilities and also a higher hospitalization rate due to diabetes among this population when compared with the general population.³ A systematic review found that 12.8% of people with disability are affected by diabetes in the South-East Asian region.⁴

This cohort of people is more prone to diabetes-related avoidable hospitalizations.⁵ A systematic review conducted to find the diabetes prevalence among people with intellectual disabilities reported an average prevalence of diabetes to be 8.3% in this population ranging from 0.4% to as high as 25%.⁶

Diabetes mellitus is a lifestyle disorder with multiple risk factors including intake of a diet rich in carbohydrates, low levels of physical activity, less intake of healthy foods such as fruits and vegetables, and lack of exercise. A good control of diabetes is achieved when treatment adherence and periodic follow-up are combined with proper lifestyle modifications.⁷ Self-care management plays a vital role in diabetes management and they help to achieve the therapeutic goals of diabetes care.⁸ Self-care management plays a vital role in the prevention of secondary complications due to diabetes and help to lead a good quality of life.⁹ The self-care or self-management for diabetes consists of several components such as healthy diet, physical activity, treatment adherence, treatment monitoring, eye examinations, foot examinations, dental examination, good problem-solving



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skills, healthy coping skills, and reducing risky behaviours such as smoking and alcohol use.^{10,11} There are various barriers for poor self-management for diabetes among people with disabilities such as lack of access to equipment of care, difficulties in adaptation, and poor competence of the treatment provider and care givers of the persons with disabilities.¹¹ Dependency on care givers, lack of standard guidelines for diet and physical activity for people with disabilities, lack of accessibility to higher healthcare facilities for screening of secondary complications, are some of the barriers in self-management of diabetes among disabled people.¹² Low levels of motivation, higher dependency on others, balancing difficulties, fear of falls, musculoskeletal issues, depression, lack of knowledge and awareness, financial status, are other barriers to adopt healthy lifestyle among them.¹³

There is a scarcity of evidence regarding the diabetes self-management behaviours among people with disabilities. This information is crucial in understanding the gaps in self-management for diabetes and to provide a comprehensive diabetes care services and to promote the self-care behaviours to avoid the secondary complications of diabetes in this cohort. This systematic review was undertaken to evaluate good diabetes self-care behaviours among people living with disabilities.

MATERIALS AND METHODS

Criteria for inclusion of studies

Population – Adult persons with disabilities who have diabetes mellitus

Outcome – Good self-management practices for diabetes mellitus including diabetic diet, exercise, treatment adherence, treatment monitoring, eye examinations, foot examinations, dental examination, good problem-solving skills, healthy coping skills, and reducing risky behaviours such as smoking and alcohol use

Types of studies - Epidemiological observational studies such as cross-sectional studies, cohort studies, case-control studies, and experimental studies published between 1990 to 2022

Age criteria of 18 years and above

Physical, locomotor, sensory, intellectual, cognitive, psychological and communication disabilities were included in the review

Criteria for exclusion of studies

Studies describing self-management for gestational diabetes

Studies reporting children and adolescents with type 1 diabetes

Sources of information

PubMed database was used for searching the existing relevant literature for conducting the systematic review. Since we did not have access to other search engines that are subscription based,

we could not use them. We performed the search on 13 December 2022.

Search Strategy

We used the following search terms given below from PubMed database to identify the research studies to be included in our systematic review.

("diabete"[All Fields] OR "diabetes mellitus"[MeSH Terms] OR ("diabetes"[All Fields] AND "mellitus"[All Fields]) OR "diabetes mellitus"[All Fields] OR "diabetes"[All Fields] OR "diabetic"[All Fields] OR "diabetics"[All Fields] OR "diabets"[All Fields] OR ("diabetes mellitus, type 2"[MeSH Terms] OR "type 2 diabetes mellitus"[All Fields] OR "type 2 diabetes"[All Fields]) OR ("diabetes mellitus"[MeSH Terms] OR ("diabetes"[All Fields] AND "mellitus"[All Fields]) OR "diabetes mellitus"[All Fields])) AND ("self management"[MeSH Terms] OR "self management"[All Fields] OR ("self"[All Fields] AND "management"[All Fields]) OR "self management"[All Fields] OR ("self care"[MeSH Terms] OR ("self"[All Fields] AND "care"[All Fields]) OR "self care"[All Fields]) OR ("self efficacy"[MeSH Terms] OR ("self"[All Fields] AND "efficacy"[All Fields]) OR "self efficacy"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields])) OR (("life style"[MeSH Terms] OR ("life"[All Fields] AND "style"[All Fields]) OR "life style"[All Fields]) AND ("modification"[All Fields] OR "modifications"[All Fields])) AND ("disabilities"[All Fields] OR "disability"[All Fields] OR "disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "disabled"[All Fields] OR "disablement"[All Fields] OR "disablements"[All Fields] OR "disabling"[All Fields] OR "disability"[All Fields] OR ("disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "persons"[All Fields] AND "disabilities"[All Fields]) OR "persons with disabilities"[All Fields]) OR ("disabilities"[All Fields] OR "disability"[All Fields] OR "disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "disabled"[All Fields] OR "disablement"[All Fields] OR "disablements"[All Fields] OR "disabling"[All Fields] OR "disability"[All Fields]) OR ("disabilities"[All Fields] OR "disability"[All Fields] OR "disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "disabled"[All Fields] OR "disablement"[All Fields] OR "disablements"[All Fields] OR "disabling"[All Fields] OR "disability"[All Fields]) OR (("differ"[All Fields] OR "differed"[All Fields] OR "difference"[All Fields] OR "differences"[All Fields] OR "differencies"[All Fields] OR "different"[All Fields] OR "differently"[All Fields] OR "differents"[All Fields] OR "differing"[All Fields] OR "differs"[All Fields]) AND "abled"[All Fields]) OR ("locomotor"[All Fields] OR "locomotors"[All Fields]) AND ("disabilities"[All Fields] OR "disability"[All Fields] OR "disabled persons"[MeSH Terms] OR ("disabled"[All Fields] AND "persons"[All Fields]) OR "disabled persons"[All Fields] OR "disabled"[All Fields] OR "disablement"[All Fields] OR "disablements"[All Fields] OR "disabling"[All Fields] OR "disability"[All Fields]) OR ("blinded"[All Fields] OR "blinding"[All Fields] OR "blinds"[All Fields] OR "visually impaired persons"[MeSH Terms] OR ("visually"[All Fields] AND "impaired"[All Fields] AND "persons"[All Fields]) OR "visually impaired persons"[All Fields] OR "blind"[All Fields] OR "blindness"[MeSH Terms] OR "blindness"[All Fields]) OR ("visual"[All Fields] OR "visualisation"[All Fields] OR "visualisations"[All Fields] OR "visualise"[All Fields] OR "visualised"[All Fields] OR "visualises"[All Fields] OR "visualising"[All Fields] OR "visualization"[All Fields] OR "visualizations"[All Fields] OR "visualize"[All Fields] OR "visualized"[All Fields] OR "visualizer"[All Fields] OR "visualizers"[All Fields] OR "visualizes"[All Fields] OR

Table 1: Characteristics of the included studies with reported prevalence of diabetes self-management behaviors among People with Disabilities.

Paper	Study Design	Study Country	Study Setting	Type of Disability	Type of Diabetes	Average duration of Diabetes	Complications (%)	Mean Age	Sex (M%)	Sampling Method	Sample Size	Self management - Diet	Self management - Exercise	Self management - Medications	Self management - Monitoring	Self management - risk reduction	Self management - foot care	Self management - Tooth care	Self management - Others
Natovich R <i>et al.</i> , 2020 (9)	Experimental	Israel	Hospital and Community	Cognitive Disability	Type 2	19	Smoking (14%) Dyslipidemia (71%) Hypertension (76%) Neuropathy (43%) Retinopathy (5%) Nephropathy (38%) IHD (43%)CVD (24%)	73	62	Convenient	21	58%	16.7%	100%	72.8%	Nil	55.7%	Nil	Nil
Yan Jing <i>et al.</i> , 2020 (10)	Cross-sectional	China	Hospital	Cognitive Disability	Type 2	10.83	Hypertension (49%) Hyperlipidemia (59%)Coronary Heart Diseases (6%) Retinopathy/Cataract (15%)Peripheral Neuropathy (12%) Diabetic Foot (3%)	53.8	64.2	Convenient	140	45.1%	57.3%	75.1%	28.3%	Nil	31.4%	Nil	Nil
Jiayu Li <i>et al.</i> , 2019 (11)	Experimental	China	Hospital	Visual Disability	Type 2	10.91	Hypertension (47.5%) Coronary Artery Disease (5%) Diabetic Nephropathy (2.5%) Other heart diseases (3.75%)	64.9	47.5	Convenient	80						54.19		

The self-management scores are shown as % of days they were practiced.

“visualizing”[All Fields] OR “visually”[All Fields] OR “visuals”[All Fields]) AND (“impair”[All Fields] OR “impaired”[All Fields] OR “impairment”[All Fields] OR “impairments”[All Fields] OR “impairing”[All Fields] OR “impairment”[All Fields] OR “impairments”[All Fields] OR “impairs”[All Fields])) OR (“intellectual disability”[MeSH Terms] OR (“intellectual”[All Fields] AND “disability”[All Fields]) OR “intellectual disability”[All Fields]) OR (“mental”[All Fields] OR “mentalities”[All Fields] OR “mentality”[All Fields] OR “mentalization”[MeSH Terms] OR “mentalization”[All Fields] OR “mentalizing”[All Fields] OR “mentalize”[All Fields] OR “mentalized”[All Fields] OR “mentally”[All Fields]) AND (“disabilities”[All Fields] OR “disability”[All Fields] OR “disabled persons”[MeSH Terms] OR (“disabled”[All Fields] AND “persons”[All Fields]) OR “disabled persons”[All Fields] OR “disabled”[All Fields] OR “disablement”[All Fields] OR “disablements”[All Fields] OR “disabling”[All Fields] OR “disability”[All Fields])) OR (“persons with hearing impairments”[MeSH Terms] OR (“persons”[All Fields] AND “hearing”[All Fields] AND “impairments”[All Fields]) OR “persons with hearing impairments”[All Fields] OR “deaf”[All Fields]) OR “mute”[All Fields]) AND (“epidemiology”[MeSH Subheading] OR “epidemiology”[All Fields] OR “prevalence”[All Fields] OR “prevalence”[MeSH Terms] OR “prevalence”[All Fields] OR “prevalences”[All Fields] OR “prevalence s”[All Fields] OR “prevalent”[All Fields] OR “prevalently”[All Fields] OR “prevalents”[All Fields] OR (“epidemiology”[MeSH Subheading] OR “epidemiology”[All Fields] OR “incidence”[All Fields] OR “incidence”[MeSH Terms] OR “incidences”[All Fields] OR “incident”[All Fields] OR “incidents”[All Fields] OR “rate”[All Fields]))).

We applied filters to give us papers published from 1990–2022, and also limited the search to only English language papers.

Process of selection of studies

RT and VG searched the PubMed database using the defined search strategy. All the results were exported to Microsoft Excel spreadsheet. RT, VG, SD, and SS read the titles and abstracts and screened for eligibility of the studies to be included in the systematic review. After the initial screening of titles and abstract based on these inclusion and exclusion criteria, a list of papers was prepared after reconciliation of any disagreements by HS and KK. The full text articles of this list of papers were obtained by RT, VG, SD, and SS for further data collection. The screening was completed by 30 December 2023. The details of article screening and inclusion in the systematic review is given in Figure 1.

Process of Data Collection

RT, VG, SD and SS also extracted details such as site of study, country in which study was performed, the type of disability that the participants had, details of scales used to assess diabetes self-management, and scores of diabetes self-management. The complete data collection was accomplished by 20 Jan 2023. Any discrepancies in the data extraction were resolved by HS and KK. We did not perform a risk of bias assessment as the studies were heterogeneous in design and variables that were extracted.

RESULTS

The search in PubMed database yielded 992 publications. Of the 992 papers, 981 were excluded since they did not report diabetes ($n=306$), did not study persons with disabilities ($n=251$), did not report self-management behaviours ($n=385$), reported only the study protocols ($n=14$), were qualitative studies ($n=4$), did not report prevalence data ($n=18$), or reported gestational diabetes ($n=3$). The remaining 11 full papers were retrieved and read. Of these 11 papers, 8 did not report the self-management behaviours among people with disabilities affected by diabetes and hence were excluded. Finally, 3 papers were included in the systematic review. This is shown in Table 1. Out of 3 studies, 2 were from China and 1 from Israel. Regarding the type of disability, 2 studies reported the findings among people with cognitive disabilities and one from visual disability. All 3 studies have been conducted among people with type 2 diabetes. The characteristics of the included studies are given in Table 1 given below. As there were only three eligible studies, that too of heterogeneous designs and populations, we decided not to perform a meta-analysis. We are reporting the findings of the systematic review here.

In the experimental study done in Israel among people with cognitive disability,¹⁴ the average duration of diabetes was 19 years among the study participants with 62% of them being male. It was an experimental study to understand the effectiveness of a multi-disciplinary intervention to improve HbA1c control, change in aerobic, balance, strength, walking, and change in quality of

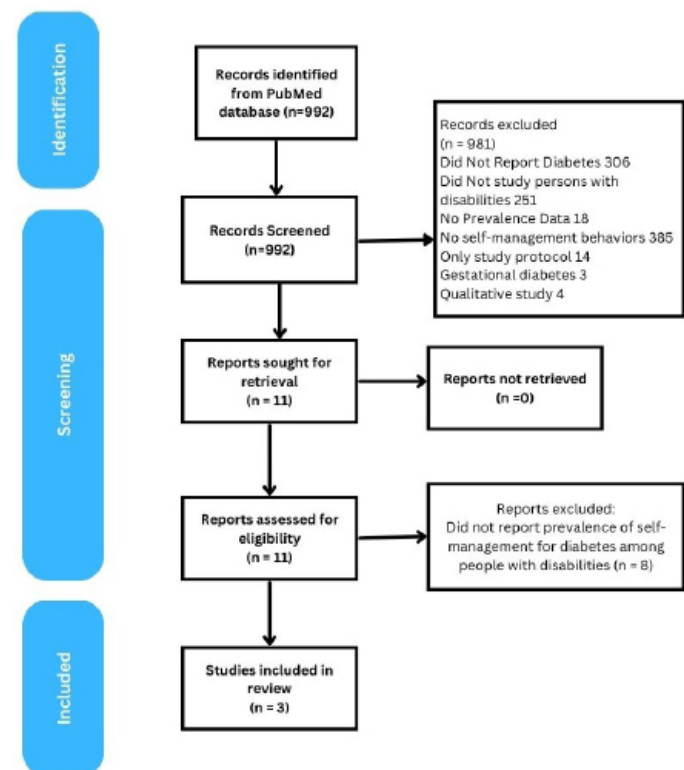


Figure 1: Flow chart of article screening and inclusion in the systematic review

life among the study participants. The study had two arms mainly medical intervention and a multidisciplinary intervention. We had considered the baseline values reported for all the participants regarding the diabetes self-care. This study had used Summary Diabetes Self-Care Assessment (SDSCA) to measure the self-care management for diabetes among the respondents. SDSCA is a brief questionnaire for reporting diabetes self-management which is a reliable and valid tool exploring diet, exercise, blood glucose testing, foot care, and smoking.¹⁵ SDSCA enquires about the self-management of diabetes in the past 7 days. The tool has a maximum score of 7 for each of its component, referring to the behavior being practiced on all 7 days of the previous week. Mean age of the participants was 73. Smoking was prevalent among 14% of the respondents. The study respondents had good dietary practices on 4.06 days, had done physical activity on 1.17 days, tested for blood glucose in the last 5.1 days, had taken diabetes medications on all days, and foot care on 3.9 days in the last 7 days.

In the cross-sectional study done among people with cognitive disability in China,¹⁶ the average duration of diabetes was 10.8 years among the respondents with 64% of them being male. This study has also used SDSCA to measure the self-care management for diabetes among the respondents and reported it in mean days. This study which was done among 140 respondents reported that they had diet as per the diabetes plan on 3.16 days, did exercise on 4.01 days, monitored their blood glucose on 1.98 days, examined their foot on 2.20 days, and taken diabetes medications on 5.26 days in the last 7 days.

In another experimental study from China done among people with visual disabilities,¹⁷ the average duration of diabetes was 10.9 years. This experimental study was done with a sample size of 80 participants, measuring the effects of an educational intervention aimed at improving foot care. This study has focused only on the foot care of self-care in diabetes self-management. It has used 17-item Diabetic Foot Self-care Behavior Scale, a 4-point Likert scale with a standard score ranging from 0 to 100. Higher the score, the better the foot care.¹⁷ The study reported that the respondents had a mean score of 54.19 on the baseline for foot care.

DISCUSSION

This systematic review has described three studies that have explored diabetes self-management behaviours among persons with disabilities. "Self-care in diabetes has been defined as an evolutionary process of development of knowledge or awareness by learning to survive with the complex nature of diabetes in a social context."¹⁰ Improving diabetes self-care can significantly reduce the development of secondary complications due to diabetes.¹⁰

In the study done among people with cognitive disabilities in Israel, the self-management practices revealed that adherence

to medications was very good, but the practice of all other self-management behaviors were poor. The practice of physical exercise was the worst.¹⁶ Similarly, the data from the other two studies from China found that the people with disabilities had below-average self-management activities.^{14,17} The prevalence of poor diabetes self-management behaviors among persons with disabilities is a matter of concern, as it would imply poorer glycemic controls and greater incidence of diabetes complications in this population.

It is important to understand why persons with disabilities have difficulties in adopting diabetes self-management behaviors. Persons with cognitive disabilities face the following problems:

1. **Monitoring:** They may forget to monitor their blood sugars periodically. They may be dependent on other caregivers to remind them.
2. **Diet:** People with cognitive dysfunction tend to eat more frequently and have poor control over their calorie intake.
3. **Physical Activity:** They tend to be dependent on others for going on walks and may forget the way to return home if they go alone.
4. **Medications:** They may be dependent on others to remind them to take their medicines and track refill of prescriptions.
5. **Personal Hygiene:** They have poor personal hygiene as they are dependent on others for that. This may increase their risk for foot ulcers and dental problems.¹⁸ This makes it challenging for them to adopt self-management behaviors. Therefore treatment of diabetes in persons with cognitive disabilities needs special attention to these unique determinants of self-management.

The 7 essential healthcare behaviors for diabetes have been positively correlated with better blood sugar control, reduction in secondary complications of diabetes, and to lead a better quality of life. But the adherence to such activities is found to be low even in the general population.¹⁰ A study conducted in India conducted among the general population with diabetes reported a higher self-care practice for treatment adherence (70%) and blood sugar testing (75%) and lower lifestyle modification components such as diet (35%) and exercise (19%).⁷ Another study found that normal people with diabetes have poor self-care practices in the domains of risk reduction, healthy coping mechanisms, and problem-solving. It stated that lower socio-economic status and lack of awareness could be the reasons for it. But the same study reported that the participants had better self-care in diet and physical activity.⁸ Therefore, it is likely that persons with disabilities have worse self-management practices. This is consistent with the findings of this review.

Our systematic review found that there are not enough studies in this domain of self-management for diabetes among people with disabilities. Therefore, there is a need to conduct well designed studies to explore this. Also, the available list of studies is not

cognizant and comprehensive of all types of disabilities. The three studies included in this review only looked at cognitive and visual disabilities. However, it is likely that persons with locomotor and communication disabilities also have challenges in adopting self-management practices. This is a key requirement in understanding the current self-management practices to devise better strategies to improve diabetes self-management and the overall quality of life for people with disabilities.

Diabetes self-management among people with disabilities is one of the important focus areas given the chronicity of the disease which affects the already vulnerable population. This systematic review is the first of its kind that looked at the prevalence of self-management practices for diabetes among people with disabilities. We have included studies that reported the self-management of diabetes among people with disabilities irrespective of the country of reporting which gives a global perspective. We believe these are the strengths of this review.

However, there are certain limitations to this study. The search was done using only a single database/search engine through PubMed. Other search engines were not included as they were not accessible by the researchers of this study. We have included studies that are available only in English and not in other languages.

CONCLUSION

This systematic review revealed that the self-care practices for diabetes among people with disabilities are inadequate. We need well-conducted studies done in a systematic manner on disabilities and diabetes and their intersections for better evidence-based decision-making to ensure better and holistic healthcare for people with disabilities. Self-care for diabetes has to be imparted under the routine diabetes care for people with disabilities.

REGISTRATION

A detailed review protocol was developed and the study protocol was registered in PROSPERO (Registration ID: CRD42022349813). We made amendments to the protocol as there was a change in the search terminologies to yield a better number of search results. The protocol was edited as per the change in the search strategy.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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