

Review Article:

Factors influencing self-management of Diabetes Mellitus; a review article*G. Kisokanth¹, S. Prathapan², J. Indrakumar³, J. Joseph¹**Abstract**

To review recent data to identify the factors influencing the effective self-management of Diabetes Mellitus (DM). A review of the published literature on self-management of diabetes was performed. This involved searching databases using the search terms Self-management of Diabetes Mellitus, DM and its management, management of type 2 DM, prevalence of diabetes and risk factors for DM. Included studies were conducted in different parts of the world between 1993 and 2013. An attempt was made to contact corresponding authors for further information for this study. We included 34 articles in our review. Self-management of diabetes were consistent with those found in several studies, i.e. individuals most regularly followed their prescribed medication regimen and least regularly followed recommendation for lifestyle changes of diet and exercise. The important determinants of self-management are transient situational factors such as environmental factors, psychological factors and social factors. Interventions to promote better self-management have reported in several studies. Initial improvement in better glucose control can be achieved by self-management education. Successful self-management of DM requires that individuals with DM frequently monitor their blood glucose levels and take required action in order to keep blood sugar within a physiological level. This can be achieved by self-management education, self-monitoring and social support. Cultural influences also have interfered with successful diabetes self-management. The chronic care model is recommended for the self-management of DM.

Key words: Self-management, diabetes mellitus, self-education

¹Department of Supplementary Health Sciences, Faculty of Health-Care Sciences, Eastern University, Sri Lanka.

²Department of Community Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka.

³Department of Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka.

Corresponding author:(Current Details)***Gnanaselvam Kisokanth**

Department of Supplementary Health Sciences, Faculty of Health-Care Sciences, Eastern University, Sri Lanka.

E-mail: kiso.1983@yahoo.com

Introduction

Diabetes Mellitus (DM) is a major public health concern worldwide. There will be an alarming increase in the population with type 2 diabetes both in developed and developing countries over the next two decades (1). The global

prevalence of DM was estimated to increase, from 4% in 1995 to 5.4% by the year 2025 (2). In 2011, 366 million people (8.3%) worldwide were affected by DM. Numbers are expected to rise to 552 million (9.9%) for DM by 2030. In 2011, 71.4 million people (8.3%) in South East Asia were affected by DM. Numbers are expected to rise to 120.9 million (10.2%) for DM by 2030 (3).

Complications of DM are physiologically harmful. DM is a condition that, if it is uncontrolled, it can produce lifelong complications affecting different organs of the body (4). DM is an important cause of morbidity and mortality all over the world. Because of lack of awareness, most patients with DM suffer from its complications. (5). Self-management of DM aims at normalizing blood glucose content and reducing the risk of long term complications. Ideally, the rationale, implementation and goals of self-management are formulated in close collaboration between the person with DM and the health care team (6).

The self-management of DM optimizes metabolic control, prevents acute and chronic complications of DM and optimizes quality of life. Diabetic self-management would be considered the cornerstone of the overall management of DM. That is, once an appropriate medical regimen is determined, the burden is on the individual to modify or maintain the complex set of behaviors needed to manage DM on daily basis. In particular, daily management of diabetes generally involves regular eating and exercise plan, self-testing blood glucose levels and taking medication. The goal of this combination of tasks is to maintain glucose levels in a target range (7).

The objective of this study was to review published articles to identify the factors influencing self-management of DM.

Methodology

A review of the published literature on self-management of DM was performed. This involved searching MEDLINE database using the search terms Self-management of DM, DM and its management, management of type 2 DM, prevalence and risk factors for DM. Only studies in English were included. About 34 eligible studies were conducted between 1993 and 2013. An attempt was made to contact corresponding authors by emails for necessary clarification. The findings were described under the heading of self-management by formal diabetes education, self-monitoring of blood glucose (SMBG), cultures influencing self-management of DM, social support for diabetes self-management, and barriers to self-management of DM.

Results and Discussion

Self-management of diabetes mellitus

Self-management is defined as a set of skilled behaviors engaged in to manage one's own illness. This emphasizes the responsibility and role of the individual in managing the disease (7).

Self-management of DM is undoubtedly the key component in the struggle for the normal lifestyle with minimal complications. The ability to learn, combined with willingness to accept responsibility for self-management, can be the

major determinant of long term prognosis in DM (8).

Self-management by formal diabetes education

Self-management of DM can be achieved by self-management education (9). Diabetes self-management education is the process of providing the person with diabetes the knowledge and skills needed to perform self-care, manage crisis and make lifestyle changes required to successfully manage the disease. The goal of the process is to enable the patient to become the most knowledgeable and hopefully the most active participant in his or her diabetes care (10). Further, Naik et al., (11) also emphasized the importance of patient education for better outcomes of self-management of diabetes, stated that patient education is an integral component of high quality diabetic care. Diabetes education programmes stress the need for the patients to have a practical understanding of approaches to self-management of diabetes and related conditions. Knowledge and understanding are important elements in moving an activated patient towards better self-management of diabetes.

The efficacy of diabetes self-management education

Diabetes education has more proximal outcomes such as changes in knowledge, attitudes, quality of life and self-care behaviors of patients. A number of studies were done to show the effectiveness of self-management of DM by education. Study done by Funnell et al., (12) found that self-management education helps patients to make decisions about their care and obtain clarity about their goals, values and motivations. It also helps to learn about DM and how to safely care for it on a daily basis. In the same study, it was stated that a one-time education programme is rarely effective to sustain the types of behavioral changes needed for a life time diabetes self-care. Further, self-management education provides the information regarding various treatment options and the benefits and costs of each of these strategies, how to make changes in their behaviors and to solve problems.

Another study states that diabetes education has an effect on short term outcomes (HbA1c, blood glucose variability, hypoglycemic episodes) as well as long term health outcomes (complications prevention) (13).

Pimouguet et al., (14) suggested that diabetes management education programs have favorable effects on improving glycemic control with a pooled standardized mean reduction of 0.38 in HbA1c level compared with usual care.

Factors influencing the diabetes self-management education

A study by Rickheim et al., (15) stated that there are no differences between individual education and group education. This finding suggests that group education could be a solution to cope with the lack of medical providers and the time consuming aspects of individual education. In another study, Naik et al., (11) assessed the effectiveness of traditional diabetes education and empowerment approach education for the self-management of diabetes. At the end of the study, participants in the empowerment group demonstrated greater understanding of DM and their own values of HbA1c, Blood pressure, blood cholesterol and greater knowledge on target goals compared with traditional group. It emphasized that diabetes education should have an active learning, empowerment based approach to obtain better outcomes in self-management of DM.

A study done among Turkish people with type 2 DM indicated that there were differences in well-being between subjects who had participated and had not participated in a diabetes education program (13). Further, Tankova et al., (16) stated that a 5-days structured training programme improved quality of life and metabolic control of the patients with DM.

Self-monitoring of blood glucose (SMBG)

Self-management of DM remains the cornerstone of diabetes care. Every effort should be made by all involved with diabetes care to support SMBG as part of an overall self-management strategy (17). Further, self-monitoring of blood glucose and regular blood pressure (BP) measurement are essential

for better well-being of DM (18). Similarly, in a study by Andrew (8) stated that home blood glucose monitoring has become a central component of active self-management of DM. Self-monitoring blood glucose has proven effective for the patients with type 1 DM as well as the patients with type 2 DM. The patient might cope more independently with their disease with self-monitoring of blood glucose and they might achieve a better understanding about the factors that affect their disease and potentially a better perceived quality of life (19).

SMBG and subsequent glycemic control

A study done in Northern California stated that SMBG among patients with type 1 diabetes (= 3 times daily) and pharmacologically treated type 2 DM (at least daily) was associated with lower HbA1c level than with less frequent monitoring. As monitoring frequency increases, HbA1c level declined. In pharmacologically treated patients, the largest improvement in HbA1c level was observed with monitoring at the recommended frequency (at least 3 times daily in patients with type 1 diabetes or at least daily in patient with type 2 diabetes), whereas lesser frequencies of monitoring conferred little benefit (20).

SMBG and insulin administration are considered essential for the day to day management of diabetes. SMBG aims at collecting information on blood glucose levels at different time points during the day and allows for the timely identification of high levels. SMBG has proven effective for patients with type 1 DM and patients with type 2 DM who are using insulin, because the information about a patient's glucose level is useful to refine and adjust insulin dosages, resulting in an improved glycemic control (10).

Cultures influencing self-management of DM

Understanding the influence of culture on health care practices can improve DM outcomes. Integrating cultural constructs into diabetes care that target ethnic groups can result in greater patient satisfaction. The members of many ethnic and racial groups possess attitudes, beliefs, and values related to health, making the development of cultural

competence essential for every health care provider (21).

A study from Thailand shows that Thai culture influences diabetes perceptions and management. People in Thai believe that diabetes is perceived as a sugar-related illness, which is caused by either biological (genetic or old age) or cultural (result of previous Karma) factors. Thais' eating patterns are influenced by both individual and cultural factors. Cultural contexts include the convenience and abundance of choices in tropical hyperglycaemic fruits. Individual contexts were characterized by responsiveness to the availability of preferred foods. People attempted to eat healthfully to reduce sugar and cholesterol levels; nevertheless this was also influenced by traditions and the availability of foods. The study stresses the need to have culturally appropriate treatment guidelines for diabetes management and to have special consideration to the significance and meaning of food in DM and to Buddhist beliefs (22).

Sudanese also believe that cultural backgrounds of the religious beliefs and practices, family structure and diet have a profound effect on the progress and care of people with DM (23). In the South Asian community, the culture does not influence self-management of DM in a rigid and prescriptive way; instead, individuals negotiate and interpret culture in a shifting and diverse context. Therefore an individualized approach to delivering culturally appropriate nursing care for DM should be undertaken (24). Another study that was done in United Kingdom among Asians shows that the management of the Hindu patients with diabetes is not complicated. However, it stresses the importance of life-style changes on both the individual patient and the community (25).

A survey designed to evaluate disease self-management techniques among Mexican Americans with type 2 DM found that medications are considered a "safety valve." Many patients do not take their medications regularly, but instead save them for days when they are unable to eat healthfully, thinking that the medication can counteract a particular dietary indiscretion. Recognizing that living with diabetes involves numerous daily self-

management decisions, physicians should seek to understand the daily barriers patients face and together with the patient, develop strategies to effectively deal with those barriers. One of the barriers to good diabetes care is cultural beliefs about insulin. People have many fears and misconceptions regarding insulin usage. Common misconceptions include the belief that the need for insulin indicates a patient's personal failure to manage his or her disease, and that if insulin is needed, the patient must indeed be very sick. Some patients have even greater fears about insulin. They believe insulin caused blindness and several patients related stories about relatives who became blind shortly after beginning the insulin therapy. Others were concerned that continued insulin use would lead to dependence. The initiation of insulin appears to pose a difficult passage for patients in any clinical setting (26).

Social support for self-management of DM

Social support refers to the individual's perception that assistance is readily available when one needs it. Support can be obtained from number of sources including friends, family members and physician (27).

Social support is not only positively associated with the individual's perceived self-efficacy in conducting diabetes related tasks, but also associated with the actual self-management behaviors (28). This is evidenced in several studies. The study done by Moser et al., (29) found that self-management is heavily influenced by professional recommendations. Understanding the process that underlies self-care will enable diabetes specialist nurse to provide diabetes counseling which goes beyond the educations, symptoms management, compliance and metabolic control. Further, involvement of family care givers also will lead to the successful self-management of DM.

In a study among individuals with type 2 DM, the attending physician was most frequently (43%) identified as the primary source of support, followed by the spouse (20%) or other family members. Satisfaction with support was a predictor for improved diabetes-specific quality of life and blood glucose monitoring (30). A study conducted on self-management among

patients living with diabetes in the United States' Virgin Islands shows that health care providers should focus on creating an environment in which patients are invited to and feel comfortable sharing the modifications and alternative medications they may incorporate into their self-care plan. Importantly, providers can routinely assess patient's knowledge and understanding of DM and make culturally-relevant resources available (31).

Barriers to self-management of DM

Identifying barriers to diabetes self-management is critical step in achieving optimal health outcomes (32). Several studies show the barriers for self-management of diabetes.

Health information

Study done by Elizabeth et al., (33), stated that self-management of DM has multiple influences including patient factors, health care team factors and social /environmental factors, all of which need to be addressed to assist patients in successfully managing their DM. Further, a qualitative study done on type 2 DM patients found that health information received on DM by the patients were quite confusing, as the attending physicians are not forthcoming with information pertaining to diabetes and lack of awareness of target blood glucose level and of blood pressure as major barriers for improved self-management of DM (32).

Knowledge level of the patient

In order to appropriately manage one's diabetes, knowledge about the condition is imperative. Lack of knowledge ranks high in studies investigating the barriers to self-management of DM. Knowledge of diabetes care has been associated with activities such as taking medication, diet, exercise, blood glucose monitoring and foot care (27).

Patients with low literacy have poor knowledge of their disease and may have difficulties learning the advanced self-care skills needed to improved glycemic control. This was evidenced in the study done by Rothman et al., (34); stated further, literacy would be an important factor for predicting those who

would benefit from an intervention for self-management of DM.

Motivation and other psychological factors

A study identified motivation as a major barrier for self-management of DM. Motivation may be extrinsic, such as the type of motivation provided by the health care team. However, it is the intrinsic motivation that seems more important in active self-management of diabetes. The same study states that depression may negatively affect how individuals take care of themselves as such loss of interest, reduce decision making ability and fatigue are likely to contribute to the poor self-management of DM (6).

Conclusion

Successful self-management of DM requires that individuals with disease frequently monitors their blood glucose levels and take required action in order to keep blood sugar within physiological level. This can be achieved by self-management education, self-monitoring and social support. Cultural influences also have interfered with successful self-management of DM. In order to improve glycemic control, efforts should be employed to identify any barriers and the means to overcome them for good self-management of DM.

As seen on the review, as there are no models for self-management of DM, we recommend that using the chronic care model (CCM), a self-monitoring for improved self-management of DM is of urgent need, which would include decision support, self-management support and delivery system design.

Acknowledgement

We wish to thank all authors for their articles which were reviewed in this study. Dr. Shamini Prathapan is supported by the ASCEND Program (www.med.monash.edu.au/ascend) funded by the Fogarty International Centre, National Institutes of Health, under Award Number: D43TW008332. The contents of this paper is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health of the ASCEND Program.

References

1. Rani PK, Raman R, Subramani S, Perumal G, Kumaramaniakavel G, Sharma T. Knowledge of diabetes & diabetic retinopathy among rural populations in India; a influences of knowledge of diabetic retinopathy on attitude and practice. Rural and Remote Health Journal 2008, 8(3):838.
2. Ramachandran A, Snehalatha C, Kapur A, Vijay V, Mohan V, Das AK et al. High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. Diabetologia 2001, 44:1094-1101.
3. Diabetes Association of Sri Lanka. Facts and Figures. Available at: <http://www.diabetessrilanka.org/home/facts-figures>. Accessed on: January 10, 2013.
4. AlShafae MA, AlShukaili S, Rizvi SGA, AlFarsi Y, Khan MA, Ganguly SS, et al. Knowledge and perceptions of Diabetes in a semi-urban Omani population. Biomed Central Public Health 2008, 8:249.
5. Gul N. Knowledge, attitudes and practices of type 2 diabetic patients. Journal Ayub Medical College Abbottabad 2010, 22(3): 121-128.
6. Ahola AJ, Groop PH. Barriers to self-management of diabetes. Diabetic Medicine 2013, 30: 413-420.
7. Ruggiero L, Glasgow RE, Dryfoos JM, Rossi JS, Prochaska JO, Orleans CT et al. Diabetes self-management, self-reported recommendations and patterns in a large population. Diabetes care 1997, 20 (4):568-575.
8. Andrew F. Self-management of diabetes mellitus. Canadian Medical Association Journal 1995, 153(3): 254.
9. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes, a meta-analysis of the effect on glycemic control. Diabetes Care 2002, 25(7):1159-71.
10. Clement S. Diabetes self-management education. Diabetes care 1995, 18(8): 1204-1214.
11. Naik AD, Teal CR, Rodriguez E Haidet P. Knowing the ABCs: A comparative effectiveness study of two methods of diabetes education. Patient Education and Counseling 2011, 85(3):383-9.
12. Funnell MM, Anderson RM. Empowerment and self-management of diabetes. Clinical Diabetes 2004, 22(3):123-127.
13. Ozer E, Sengul AM, Gedik S, Salman S, Salman F, Sargin M et al. Diabetes education: a chance to improve well-being of Turkish people with type 2 diabetes. Patient Education and Counseling 2003, 51:39-44.
14. Pimouguent C, Goff ML, Thiebaut R, Dartigues JF, Helmer C. Effectiveness of diabetic management program for improving diabetic care: a meta-analysis. Canadian Medical Association Journal, 2011, 183(2):115-127.
15. Rickheim PL, Weaver TW, Flader JL, Kendall DM. Assessment of group versus individual diabetes education. Diabetes Care, 2002, 25 (2):269-274.
16. Tankova T, Dakovska G, Koev D. Education of diabetic patients - a one year experience. Patient Education and Counseling 2001, 43:139-145.
17. Miller D, Berard L, Cheng A, Hanna A, Hagerty D, Knip A et al. Self-Monitoring of Blood Glucose in People with Type 2 Diabetes: Canadian Diabetes Association Briefing Document for Healthcare Providers. Canadian Journal of Diabetes 2011, 35(4):317-319.
18. Upadhyay DK, Palaian, SP. Shankar R, Mishra P. Knowledge, attitude and practice about diabetes among diabetes patients in Western Nepal. Rawal Medical Journal 2008, 33(1): 8-11.

19. Welschen LMC, Bloemendal E, Nijpels, G, Dekker JM, Heine, RJ, Stalman WAB et al. Self-monitoring of blood glucose in patients with type 2 diabetes who are not using insulin. *Diabetic care*, 2005, 28(6): 1510-1516.
20. Karter AJ, Ackerson LM, Darbinian JA, Agonsino RB, Ferrara A, Liu J et al. Self-monitoring of blood glucose level and glycemic control: Northern California Kaiser Permanente Diabetes registry. *The American Journal of Medicine* 2001, 111(1):1-9.
21. Catherine AC, Kevin MC, Christine MLK. Cultural and family challenges to managing type 2 diabetes in immigrant Chinese Americans. *Diabetes Care* 2009, 32 (10): 1812-1816.
22. Napaporn S, Naipinich K, Keith JP. The influence of Thai culture on diabetes perceptions and management. *Diabetes Research and Clinical Practice* 2009, 84 (3):245-251.
23. Ahmed AM. Cultural aspects of diabetes mellitus in Sudan. *Practical Diabetes International* 2003, 20 (6): 226-229.
24. Fleming E, Gillibrand W. An exploration of culture, diabetes, and nursing in the South Asian Community. *Journal of Transcultural Nursing* 2009; 20(2): 146-155.
25. Patel V, Morrissey J, Goenka N, James D, Shaikh S. Diabetes care in the Hindu patient: cultural and clinical aspects. *British Journal of Diabetes & Vascular Disease* 2001, 1(2):132-135.
26. Caballero AE, Tenzer P. Building cultural competency for improved diabetes care. *The Journal of Family Practice* 2007, 56(9):29-38.
27. Ahola AJ, Groop PH. Barriers to self-management of diabetes. *Diabetic Medicine* 2013, 30 :413-420.
28. Heisler M, Piette JD. I help you and you help me; facilitated telephone peer support among patient with diabetes. *Diabetes education* 2005, 6:869-879.
29. Moser A, Bruggen HV, Widdershoven G, Spreemenberg C. Self-management of type 3 diabetes mellitus: a qualitative investigation from the perspective of participants in a nurse-led shared-care programme in the Netherlands: *BMC Public Health* 2008, 8:91-99.
30. Tang TS, Brown MB, Funnell MM, Anderson RM. Social support, quality of life and self-care behaviors among African American with type 2 diabetes. *Diabetes Educator* 2008, 34(2):266-276.
31. Nunez MA, Yarandi H, Nunez-Smith M. Self-management among patients living with Diabetes in the United States Virgin Islands. *Journal of Health Care Poor Underserved* 2011, 22(1): 271-283.
32. Onwudiws NC, Mullins D, Winston RA, Shaya FT, Pradel FG, Laird A et al. Barriers to self-management of diabetes: a qualitative study among low-income minority diabetics. *Ethnicity and Disease* 2011, 21:27-31.
33. Elizabeth EG and Russell EG. Physician's role in diabetes self-management. Helping patients to help themselves. *The Endocrinologist* 1996, 6(3):20-26.
34. Rothman RL, DeWalt DA, Malone R, Bryant B, Shintani A, Criglar B et al. Influence of patient literacy on the effectiveness of a primary care - based diabetes disease management program. *Journal of the American Medical Association* 2004, 292(14): 1711-1716.