



Self-management Behavior Interventions for Type 2 Diabetes Mellitus: A Review

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Abstract

BACKGROUND: Diabetes mellitus is chronic diseases with serious complications and reduces the quality of life of patients. Evidence based strategies to enhance diabetes self-management may prevent complications and enhance the quality of life for patients is needed.

AIM: This study to summarize the types of intervention strategies used to enhance diabetes self-management behaviors in adult individuals type 2 diabetes mellitus (T2DM).

METHOD: This study was used Literature review randomized controlled trials study. PubMed, Scopus, Web of Science, and Cochrane Library data base were used. Jadad scale checklist was used to evaluate quality appraisal included in the study.

RESULTS: Twenty-six randomized controlled trials studies were included in this review. Overall, quality of the studies was high-quality. Varied interventions included studies at different countries were found to enhance diabetes self-management behaviors in T2DM patients. In addition, almost type interventions were reported a significant enhancement diabetes self-management behaviors especially in adults with type 2 diabetes patients.

CONCLUSION: Varied self-management behavior interventions in diabetes mellitus. This review suggested for investigate best intervention to enhance diabetes self-management behaviors in different cultural for best outcomes.

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Introduction

Diabetes mellitus is a dramatically increasing epidemic worldwide, with a global prevalence of approximately 8.5% of the adult population with type 2 diabetes mellitus (T2DM) [1], rate of T2DM predicted more than 60% in the Asian region by 2030 [2]. There were 85.7% fail to control the glycemic which assessment by Hemoglobin HbA1c level. This serious health problem requires self-management to control the disease and associated complications. Self-management includes, but is not limited to, managing a specific nutrition program, exercise program, blood glucose monitoring, and medication administration strategies [3]. The complications of DM include heart disease, stroke, kidney failure, amputation, losing vision, and neurological damage. While the major care are outpatient care, a contributing factor is self-management behaviors which are increasingly encouraged significant. The QOL of T2DM patients will enhance and reduces the risk of complications if there are strategies to enhance self-management behaviors of diabetes [4].

Diabetes self-management support decision-making, self-care abilities, solving problems and

dynamic cooperation with the team of caring to develop patient outcomes and their QOL [5]. Diabetes self-help (DSMS) is pursuits that support diabetes patients to implement and maintain the necessary behaviors to manage their condition on a continuous basis outside of the training self-management. Despite advances in diabetes treatment, diabetes self-management still remains multiplex and hard to apply to the lifestyle in diabetes patients [6]. Furthermore, it depends to type of support provided can be behavioral, educational, psychosocial, or clinical strategies [5].

Based on appropriated self-care behaviors comprising medication adherence, physical activity, health nutrition, and caring feet regularly that can be manage glycemic and prevent health risks in diabetes patients. There is an evidence to suggest that social support increase diabetes self-management behaviors [7]. Self-management behaviors consist of taking medicine appropriate, testing blood glucose, foot care, do not use alcohol, and tabaco. There is an evidence that enhance diabetes-related outcomes based on good eating habits, 30 min physical exercise [8].

Many intervention studies used to enhance diabetes self-management behaviors. However, there was not review to summarize all the interventions to

investigate the effective intervention. Therefore, this review summarized of intervention strategies used to enhance diabetes self-management behaviors in T2DM patients in randomized controlled trials (RCTs).

Methods

Literature review was conducted. Cochrane Library, PubMed Scopus, and Web of Science databases were conducted for studies published up to 2021. Search terms included those related to self-management behaviors, T2DM, and intervention studies; *“self-management behaviors” OR “self-care behaviors” AND “type 2 diabetes” AND “intervention.”*

Included and excluded studies

Studies were included in this review following criteria; (1) randomized controlled trials (RCTs) study (2). Subjects of the study is adult patients with diagnosed of T2DM (18 years or older) (3). Included diabetes self-management behaviors or diabetes self-care behaviors in study outcome. (4) English full text. The exclusion criteria were as follows: Comments (such as blogs and electronic newspapers), reviews, letters, guidelines, and protocols.

Study selection

Two researchers screened the article titles and abstracts for eligibility. Subsequently, the full texts of the potential studies were screened to determine final eligibility for inclusion in this review. Uncertainty concerning the inclusion of the studies was checked by a third researcher.

Data extraction

The Jadad scale checklist to appraisal the methodology quality of the included studies because this is a popular scale to be used in the worldwide, higher scores presents better quality (≥ 4 mean high-quality; < 3 mean low-quality [9]. The results of this review were presented by reviewer considering: author; year of publication; country where the research was conducted; Jadad scale; setting (community, hospital); participants; interventions; follow-up; and outcomes of significant to the review question.

Results

The initial search identified 1969 articles, of which 642 were duplicates articles and removed; 1327 articles were excluded based on title and abstract, and 174 full texts were retrieved and screened. 148 articles were excluded because those were not focus to measure diabetes self-management behaviors outcomes. Finally, 26 full texts were included in this review (Figure 1).

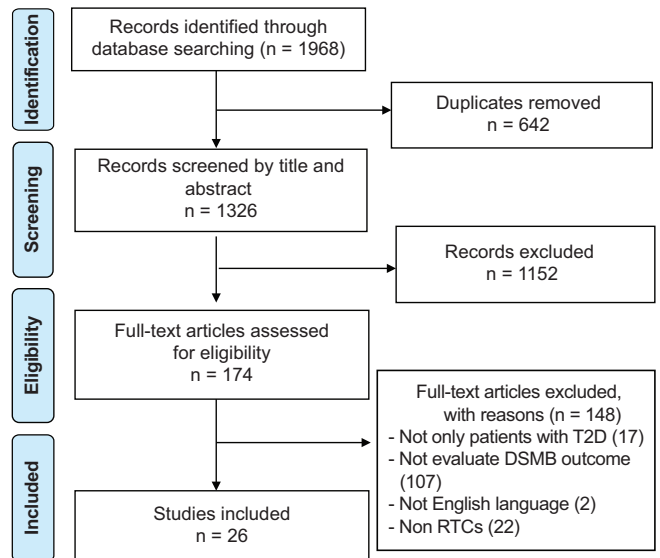


Figure 1: The process of study selection

Quality of the included studies

All of these articles showed high-quality methodology (Jadad score > 4). Three among RCTs study were single-blinded [10], [11]. The quality of methodology included studies was summarized in Table 1.

Characteristics of the included studies

Of the studies in Table 2, seven were conducted in the united States of America [10], [12], [13], [14], [15], [16], [17], [18]; three were conducted in Thailand [19], [20], [21], three were conducted in Netherlands [22], [23], [24], two were conducted in China [25], [26], [27], and one study including country; Belgium [28], France [29], United Kingdom [30], German [31], Chicago [11], Cameroon [32], Iran [33], Australia [34], Africa [35], and Taiwan [36].

The sample size ranged from 62 [13] to 1570 [35]. There were 16 studies to conduct in the hospital, and 10 studies were conducted in the community. The follow-up period of participant post intervention was about 3 months to 2 years. Almost studies used the

Table 1: The level of modified Jadad quality score

Author (year)	Modified Jadad scale						Total
	Randomization (2)	Blinding (2)	Withdrawals and dropouts (1)	Inclusion/Exclusion criteria (1)	Adverse effects (1)	Statistical analysis (1)	
Anderson (2009)	2	0	1	1	0	1	5
Sacco (2009)	2	0	1	1	0	1	5
Thoolen (2009)	2	0	1	1	0	1	5
Mehuys (2011)	2	0	1	1	1	1	6
Spencer (2011)	2	2	1	1	1	1	8
Wu (2011)	2	0	1	1	1	1	6
Liu (2012)	2	0	1	1	0	1	5
Beverly (2013)	2	0	1	1	0	1	5
Trouillouand (2013)	2	0	1	1	0	1	5
Van Vugt (2013)	2	0	1	1	0	1	5
Forjuoh (2014)	2	0	1	1	1	1	6
Mash (2014)	2	0	1	1	0	1	5
Rothschild (2014)	2	2	1	1	1	1	8
Steed (2014)	2	0	1	1	1	1	6
Assah (2015)	2	0	1	1	0	1	5
Campbell (2015)	2	0	1	1	1	1	6
Sattayasomboon (2015)	2	0	1	1	0	1	5
Wongrochananan (2015)	2	0	1	1	1	1	6
Deng (2016)	2	0	1	1	0	1	5
Shayeghian (2016)	2	0	1	1	1	1	6
Hermanns (2017)	2	0	1	1	1	1	6
McEwen (2017)	2	0	1	1	0	1	5
Wichit (2017)	2	2	1	1	1	1	8
Wroe (2017)	2	0	1	1	1	1	6
Van Puffelen, et al., (2019)	2	2	1	1	1	1	8
Li Cheng et al., (2021)	2	2	1	1	1	1	8

summary of diabetes self-care activities (SDSCA) to measure the outcome self-management behaviors in T2DM patients. The SDSCA Questionnaire is a popular used to assess of diabetes adherence [37].

Intervention approach

There were 22 intervention methods used for improving diabetes self-management behaviors in hospital and community setting. Firstly, nineteen interventions were applied in the hospital, included: Diabetes Self-management Consultant (CDSMC) [12]; Telephone Coaching Intervention [13]; 12-week proactive coping intervention [22]; Group Map-based Program [14]; Therapeutic Education Program [29]; Web-based Intervention [23]; Chronic Disease Self-management Program (CDSMP) [15]; Group Diabetes Education [35]; Theoretical Based Self-management Intervention [30]; Community Based Peer Support [32]; Cognitive Behaviors Therapy (CBT) [16], [18]; Self-management Support Program (DSMP)[19]; The Acceptance and Commitment Therapy for Diabetes Self-management [33]; Self-management Oriented Education Program MEDIAS 2BSC [31]; and Family-based Diabetes Self-management Intervention [17], [21]; advocating empowerment in diabetes care [27]; group-based self-management support program [24].

Secondly, seven interventions were applied in community, comprised: Community Pharmacist Intervention (28); Community Health Worker Intervention [10], [11]; Self-efficacy Enhancing Intervention Program (SEEIP) [36]; Chinese Diabetes Group Visit Model [25]; Peer Support Intervention [26]; Patient Narratives Intervention [34]; and Interactive Multi-modality Intervention (IMM) [20].

There was structural diversity of interventions, and there was considerable variation in the content of the programs. In addition, there were many

different approaches to interventions to enhance self-management in T2DM patients, such as: one-to-one meeting; individual patient or group patient's education, family-oriented (patients and their family) education; peer support; telephone coaching; telephone follow-up; home visit; visual material (DVD); and web-based approach (Table 2).

Outcomes

This review studies examined a total of 22 different interventions with The Summary of Diabetes Self-Care Activities (SDSCA) to measure the outcome. There were 5 domain focuses on the outcome (diet, exercise, blood glucose testing, foot care, medication and smoking). Ten studies assessments of SDSCA were primary outcome while fifteen studies were secondary outcome.

Twenty studies [11], [13], [14], [15], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38] showed enhancement in overall or some behavior of self-management in T2DM patients. However, six studies [10], [11], [12], [16], [30], [31], [35] were not statistically significant difference to compare with control group including two studies applied method used Community Health Worker Intervention [10], [11]; Diabetes self-management consultant [12], Group Diabetes Education [35], Theoretical Based Self-management [30], Self-management Oriented Education Program [31].

Discussion

The study presents the first overview of studies that summarize intervention strategies used to enhance

Table 2: Description of studies characteristics and interventions

No	Author (year), country	Setting	Participants Total (intervention/control group)	Intervention	Components	Follow-up	Outcomes
1	Anderson (2009) USA	Hospital	Patients 310 (156/154)	Diabetes Self-management Consultant (DSMC)	Face-to-face consulting between patients and their DSMC's	2 years	No significant
2	Sacco (2009) USA	Hospital	Patients 62 (31/31)	Telephone Coaching Intervention	Education course 1 st three months: one phone call/week 3 months later: 2 weeks/one phone call Individual meeting: patients discuss their experiences	6 months	Significant increase of diet, exercise and foot care.
3	Thoolen (2009) Netherlands	Hospital	Patients 197 (89/108)	12-week Proactive Coping Intervention	Group meeting: work on personally relevant goals (exercise, diet, medication)	12 months	Significant increase of diet, exercise, and medication
4	Mehuys (2011) Belgium	Community	Community pharmacist 66 (35/31) Patients 288 (153/135)	Community Pharmacist Intervention	Education T2DM and complications Correct taking and adherence of medication Healthy lifestyle education Reminders annual eye and foot care	6 months	Significant increase of exercise and foot care
5	Spencer (2011) The USA	Community	Patients 183 (84/99)	Community Health Worker Intervention	Education classes 80 hours 2 home visits of 60 minutes each Patients with their health provider visit the clinic	6 months	No significant
6	Wu (2011) Taiwan	Community	Patients 145 (72/73)	Self-efficacy- Enhancing Intervention Program (SEEIFP)	Joined in counseling meeting, and telephone follow-up Each group of 10–15 members had four weekly sessions Group facilitator contacted the participants by telephone at 8 and 16 weeks after the intervention	6 months	Significantly increased with the outcome compare with control group
7	Liu (2012) China	Community	Patients 208 (119/89)	Chinese Diabetes Group Visit Model	Introduction/feedback Group education Questions and answers Planning and closing One-on-one visits with health care providers	12 months	Significantly increased with the outcome compare with control group
8	Beverly (2013) USA	Hospital	Patients 135 (68/67)	Group Map-based Program	Diabetes overview Diabetes and healthy nutrition Monitoring blood glucose Natural course of diabetes	12 months	Significantly increased with the outcome compare with control group
9	Trouillound (2013) France	Hospital	Patients 120 (60/60)	Three-day Therapeutic Education Program	Eight group meeting: interactive, patient-centered, educational and problem solving	3 months	Significant increase of diet and exercise.
10	Van Vugt (2013) Netherlands	Hospital	Patients 220 (110/110)	Web-based Intervention	A group consisted of 5–8 participants. Online self-management program Patients are provided to gain feedback on behavioral goals, action plans and assessment of the completed health behaviors	12 months	Significantly increased with the outcome compare with control group
11	Forjuoh (2014) The USA	Hospital	Patients 196 (101/95)	Chronic Disease Program (CDSMP)	6-week classroom-based program To teach participants to improve their making plans, communicate effectively. Meeting in community and clinical setting	12 months	Significantly increased with the outcome compare with control group
12	Mash (2014) Africa	Hospital	Health Center 34 (17/17) Patients 1570 (710/860)	Group Diabetes Education	To teach participants to improve their making plans, communicate effectively. Meeting in community and clinical setting 60-min group education: diabetes, living a healthy lifestyle, medication and avoiding complications	12 months	No significant
13	Rothschild (2014) Chicago	Community	Patients 144 (73/71)	Community Health Worker Intervention	Training about self-management in home for patients over 2 years	2 years	No significant
14	Steed (2014) The U.K	Hospital	Patients 124 (65/59)	Theoretical Based Self-management Intervention	Five weekly: self-regulatory and social cognitive theory	9 months	No significant
15	Assah (2015) Cameroon	Hospital	Patients 200 (100/100)	Community Based Peer Support	Based on group meetings, phone calls, individual confront with peer supporters.	6 months	Significant increase of diet, exercise, blood glucose monitoring, foot care and smoking.
16	Campbell (2015) Australia	Community	Patients 630 (335/335)	Patient Narratives Intervention	Patients gain diabetes documents and a DVD content stories related to T2Dm management	6 months	Significant increase of diet, exercise, blood glucose monitoring, and foot care.
17	Sattayasomboon (2015) Thailand	Hospital	Patients 180 (90/90)	Self-management Support Program (DSMS)	Education about T2DM, self-management medical administration, overcome with stress and problems, minimizing the self-control risks and barriers	24 weeks	Significantly increased with the outcome compare with control group
18	Wongrochananan (2015) Thailand	Community	Patients 126 (78/48)	Interactive Multi-modality Intervention (IMM)	Consist of, SMS, email and website with four main dimension: nutrition, exercise, emotion, and health care	3 months	Significantly increased with the outcome compare with control group
19	Deng (2016) China	Community	Patients 208 (97/111)	Peer Support Intervention	Basic diabetes-related knowledge Self-management Insulin-related education Skills Peer support training for diabetes self-management	7 months	Significantly increased with the outcome compare with control group
20	Shayeghian (2016) Iran	Hospital	Patients 106 (53/53)	The Acceptance and Commitment Therapy for Diabetes Self-Management	One day workshop: 2-h covers information regarding the diabetes disease process	3 months	Significantly increased with the outcome compare with control group

(contd...)

Table 2: (Continued)

No	Author (year), country	Setting	Participants Total (intervention/control group)	Intervention	Components	Follow-up	Outcomes
21	Hermanns (2017) German	Hospital	Patients 182 (92/90)	Self-management oriented education program (MEDIAS 2 BSC)	Six-weekly lessons: MEDIAS 2 BSC helps patients administer insulin injections, monitor glycemic control	6 months	No significant
22	McEwen (2017) The USA	Hospital	Patients and their family 157 dyads (83 dyads/74 dyads)	Family-based Diabetes Intervention	Six 2-h educational and social support group Two 2-h home visits scheduled weekly Three 20-min telephone calls scheduled weekly	6 months	Significant increase of diet and exercise
23	Wichit (2017) Thailand	Hospital	Family members 140 (70/70)	Family-oriented Self-management Program	Training classes, discussions in group, telephone follow-up and visit at home	13 weeks	Significantly increased with the outcome compare with control group
24	Wroe 2017 USA	Hospital	Patients 140 (67/73)	Cognitive behavioral therapy (CBT)	Considering a 'Wellbeing Group' pay attention on mind and worries Groups work every week for 6 weeks with each group from 6 to 12 individuals	12 months	Significant increase of diet, blood sugar testing and feet care
25	Van Puffelen, <i>et al.</i> , (2019) Netherlands.	Hospital	Patients 168 (82/86)	Group-based self-management support program	Group-based self-management support program for people diagnosed with type 2 diabetes (1–3 years post diagnosis) on diabetes self-care, distress and cognitions	6 Six month	intervention group showed a significantly higher increase in physical activity and diit participants in the intervention group showed significant improvements on empowerment level
26	Li Cheng <i>et al.</i> , (2021) China	Hospital	Patients 242 (121/121)	Empowerment-based transitional care program	Advocating empowerment in diabetes care	6-week	

diabetes self-management behaviors in T2DM. There are 26 studies from 14 different countries summarizing 22 different intervention strategies for enhancing self-management behaviors in T2DM patients.

The result highlighted that the efficacy of the diabetes self-management behaviors of the patients with T2DM is not consistent. The results of interventions used to enhance diabetes self-management behaviors are very different although the same instrument outcome was used. There are five interventions that show an unchanged in diabetes self-management behaviors outcomes. Although there are many different approaches to enhance self-management behavior in T2DM patients, group-based, family-based and peer support interventions show more effectively [11], [13], [14], [15], [17], [18], [19], [20], [21], [22], [23], [25], [26], [28], [29], [32], [33], [34], [36], [38]. Most studies (20 articles) were significant but did not report the detail of subscale in instrument; they displayed only the total score and its relevance between intervention and outcome. Most of the studies assessed the diabetes self-management behavior as the secondary outcome, so the subscale was not be described in detail. Overall, almost measurement outcome have been met one time; only two interventions meet two times. The findings from this review suggest many studies with different populations or time are needed to conduct to examine the effectiveness of these programs.

One of the strengths of this review, used Jadad scale, the most widely used scale in the word, to provide methodological quality of the study examined [39]. All of these articles in this review show methodology with high-quality (score >4). The use of this scale in future reviews, or in similar studies, would facilitate identification of progress in scientific evidence concerning the intervention to enhance diabetes self-management behaviors in T2DM patients.

Moreover, we employed a very thorough search strategy to identify most of the current studies of intervention on diabetes self-management behaviors in T2DM patients. However, it is nevertheless possible that some studies may only have been published in local databases and were not, therefore, included in this review.

This review has several limitations. First, this review had limitations in the synthesis of findings. This study shows only interventions that have been used to enhance diabetes self-management behavior in adults T2DM, but do not analyze and compare the effects of interventions. A meta-analysis is needed to better understand this issue.

Conclusion

This review provides a significant contribution related to intervention methods used to enhance diabetes self-management behaviors in T2DM patients. However, the effectiveness of these interventions is varied. This review suggested for investigate best intervention to enhance diabetes self-management behaviors in different cultural for best outcomes. In addition, developing hospital and community administrative services to improve diabetes self-management behaviors for this population recommended for future studies.

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