VIA MEDICA
RESEARCH PAPER
ISSN 2450–7458
e-ISSN 2450–8187

This Research Paper is accompanied by Editorial, see page 78.

Shahrzad Ghiyasvandian[1], Masoumeh Zakerimoghadam[1], Leila Mardanian Dehkordi[2], Alireza Moslemi Koupaei[1], Arezoo Rasti[1]

[1]Department of Medical Surgical Nursing, School of Nursing and Midwifery, Tehran University od Medical Sciences, Tehran, Iran

[2]Nursing and Midwifery Care Research Center, Ishafan University od Medical Sciences, Ishafan, Iran

Effects of Blended Self-Management Training on Knowledge and Self-Care Behaviors of Patients with Type 2 Diabetes: A Randomized Clinical Trial

ABSTRACT

Objective: This study aims to determine the effects of blended self-management training on the knowledge and self-care behaviors of patients with type 2 diabetes.

Materials and methods: One hundred people with diabetes participated in this randomized clinical trial and were randomized into two groups based on the block randomization method (block size = 4). The experimental group (31 men) received a three-hour training workshop plus an education course through a designed website. The control group (32 men) received routine training, which included receiving pamphlets. Researchers used diabetes knowledge and self-care behaviors tools in both groups before and two months after the completion of the intervention. Data were analyzed using SPSS version 16 statistical software.

Results: Findings showed self-care behaviors in all dimensions ($p < 0.001$) and knowledge ($p < 0.001$) in experimental group increase by blended education.

Conclusions: The findings indicate that blended training is associated with positive effect on self-management and diabetes knowledge for people with diabetes. So blended training program is highly recommended to improve treatment adherence, with low medical costs for patients. (Clin Diabetol 2023; 12; 2: 105–111)

Keywords: diabetes mellitus, diabetes self-management, self-care behaviors, diabetes knowledge, training

Introduction

Self-management forms a crucial part of type 2 diabetes (T2DM) treatment. It includes healthy food choices, frequent exercising, regular blood glucose monitoring, and dietary and insulin dose adjustments related to physical activity [1]. Self-management skills result from knowledge about the disease and understanding the interrelationships between different self-management activities and their impact on health outcomes. In diabetes management, patients' level of self-efficacy is influenced by their level of skills for self-management. Hence, patients with adequate skills and efficacy have more likelihood to adhere to the prescribed behavioral regimen necessary to attain optimal health. Acquiring diabetes self-management skills and efficacy is an ongoing learning process [2]. DSME can produce positive effects on patient behaviors and health status [3]. Diabetes self-management education (DSME) as a framework focuses on seven self-care behaviors including healthy coping, healthy

Address for correspondence:
Alireza Moslemi Koupaei
e-mail: alirm7496@gmail.com
Clinical Diabetology 2023, 12; 2: 105–111
DOI: 10.5603/DK.a2023.0007
Received: 19.09.2022 Accepted: 16.01.2023
Early publication date: 27.03.2023

eating, being active, taking medication, monitoring, reducing risks, and problem solving which needs a series of continuing training to improve patients' ability and self-efficacy to set and reach personal self-management goals [4]. Available evidence indicates that active self-management led to a decrease in mean HbA1C levels [5, 6]. The final goal of DSME is to support informed decision-making, self-care behaviors, problem-solving and active interaction with healthcare providers to empower people with diabetes (PWD). So, health care providers should endeavor to improve the quality of the education to ensure that PWD will achieve learning outcomes [3, 7, 8]. However, the evidence indicates that DSME is rarely used or is not even done in an effective way and traditional approach for DSME cannot meet the needs and expectations of PWD attending the program. An effective education requires the assessment of patients' needs, individualized personalized education, effective teaching methods and application of technology [3].

Technology-assisted self-care education interventions are increasingly suggested to patients with long-term illnesses such as diabetes that may or may not end to improved self-care compare to non-technology-based interventions [9]. Although technology is associated with positive outcomes [3], further studies are needed [10], because it is unclear which e-learning instructional designs and formats are best for teaching the skills needed for working with patients with chronic care needs [11], and little information is available on how to include hybrid technology into the life of patients with diabetes and new care models [3]. Blended learning is a teaching method that integrates technology and digital media with traditional instructor-led classroom activities. This approach is an optimal manner for time management. It is cost-effective for knowledge transfer because it improves illness perceptions in some participants with chronic conditions [12]. Over the last decade, blended learning programs (BLPs) have been widely applied, mainly in health professions education [13]. But blended education's effect is not the same in different studies [14–16].

Based on the results of previous studies and the remaining voids, this study aimed to examine the effect of blended self-management training on the knowledge and self-care behaviors of patients with type 2 diabetes.

Materials and methods

Study design

A randomized clinical trial was performed to determine the effectiveness of a blended self-management diabetes training which contain a three-hour training workshop plus an education course through a designed website.

Study population

The sample included PWD referred to the endocrinology clinic and hospitals of Tehran University of Medical Sciences. The inclusion criteria were patients between 20 to 65 years old, without major depression or sensory-motor defects or intellectual disability. Only patients who were able to read and write, and use smart devices and the Internet were included.

The G-Power Analysis software program (G-power 3.1.9) was used to calculate the number of participants required for this study. In a previous study that examined the impact of education based on self-efficacy theory on health literacy, self-efficacy, and self-care behaviors in patients with type 2 diabetes, the effect size of self-care behavior was 0.315. So, the current study used an independent t-test and calculated the number of participants based on an effect size of 0.315, a significance level of 0.05, and a statistical power of 0.90; the number of participants required for each group (the control and experimental groups) was 50.

Data collection

PWD who have inclusion criteria were selected through convenience sampling then divided into two groups of intervention [blended education intervention (n = 50, men = 31)] and control [routine education (n = 50, men = 32)] using the block randomization (block size = 4).

Patients completed demographic information, a diabetes knowledge questionnaire, and a self-care behaviors questionnaire. The experimental group participated in two three-hour diabetes self-management workshops. Workshops were held in one of the classes of the endocrinology clinic and Hospitals of Tehran University of Medical Sciences. Half an hour was reserved for patients to rest between two workshop sessions. Seventeen PWD participated in every workshop session. At first, the researcher introduced himself and stated the workshop's objectives. Then he explained diabetes, the causes of the disease, complications, and danger signs, and in the following, each patient shared their experiences and asked their questions. Finally, the researcher provided the scenario related to the problem of PWD, and they were allowed to solve the problem using self-management methods, their experiences, and learnings through the focused group.

At the end of the workshop, the principles of using the Internet and the site were provided by the researcher, which contains information related to self-management of diabetes and site address. This site was designed for the purpose of this research and is designed for diabetes self-management education under the supervision of the researchers. The educational

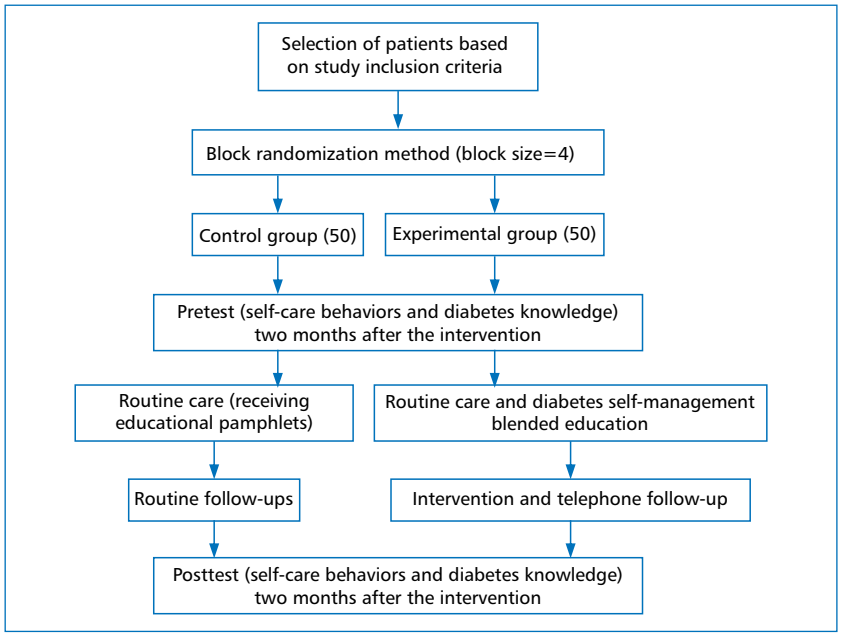

Figure 1. The Study Flow Chart

files that the researcher uploaded on the site include the definition of the disease, the causes of the disease, and diabetes self-management trainings (type of diet, physical activities, foot care, how to take medications, blood sugar control) in the form of texts, photos, videos, and questions. It is repeated along with their answers. After the workshop, the second part of the training, which was in electronic form, started. Researcher uploaded each training plan on the website weekly according to the program delivered to the patients on the day of the workshop. This plan contains education on diet, physical activity and blood sugar control, foot care, common drugs used in diabetes, and danger signs. After loading each new part of the training, the previous training plans were not deleted and remained for use. Therefore, in each session, the patients could also use the earlier parts and have access to the new educational details. The researcher makes a phone call once a week between 8:00 am and 8:00 pm based on the agreement with each patient from the experimental group to receive feedback, to ensure the use of the site's contents that week, and to remind them to refer to the relevant site and encourage their use. From the new educational materials, answer their questions about the part taught in the same week. The call duration was between 5 and 15 minutes and was based on the needs of each patient. In addition, patients could communicate with the researcher through phone calls, text messages, and social networks to ask their questions. Weekly telephone follow-up continued until one month after the intervention. The control group received routine diabetes care that included receiving educational pamphlets. This educational intervention lasted two and a half months in the experimental group. Two months later, the researcher reevaluated patients' diabetes knowledge and self-care behaviors in the experimental and control groups. None of the subjects were excluded from the study. The study flow chart is shown in Figure 1.

Knowledge about diabetes was measured using the diabetes knowledge questionnaire (DKQ) developed by Eigenmann (2011) [17] and translated by Reisi et al. (2016) [18]. Cronbach's alpha of this tool was reported by the Eigenmann as 0.76. The validity of the content of this tool was determined after translation and re-translation and use of experts' opinions, and Cronbach's alpha was 0.73. It is a valid and reliable questionnaire capable for assessing the effect of a diabetes education intervention on knowledge of diabetes and its self-management requirements in people with diabetes. This questionnaire contains 15 questions: nine questions eliciting a 'one-answer response to five multiple-choice options, and six questions eliciting an 'as many as apply' to six multiple-choice options. An 'unsure' option is included for each question. Questionnaires were scored, with each correct answer worth 1 point, each 'unsure' answer worth 0.5 and an incorrect answer received no points. This scoring system allows for all responses to be added in the total and is based on the premise that it is preferable for the participant to recognize that they are 'unsure' of the answer to thinking they know the correct answer when

Table 1. Socio-Demographic Characteristics of Participants

Variables	Experimental group Mean (SD)	Control group Mean (SD)	P-value
Age [years]	47.96 (5.85)	48.68 (5.16)	0.939*
	N (%)	N (%)	
Gender			
Male	31 (62)	32 (64)	0.836*
Female	19 (38)	18 (34)	
Marital status			
Married	40 (80)	38 (76)	0.629*
Single	10 (20)	12 (24)	
Widowed	0 (0)	0 (0)	
Job			
Homemaker	11 (22)	12 (24)	0.561**
Pensionary	2 (4)	6 (12)	
Employee	14 (28)	14 (28)	
Self-employment	22 (44)	16 (32)	
Educational levels			
Secondary school	10 (20)	8 (16)	0.081**
High school	22 (44)	27 (54)	
College	18 (36)	15 (30)	

*P-values determined using Chi-squared test; **P-values determined using Fisher's exact test; SD — standard deviation

in fact they are incorrect. Cronbach's alpha of this tool was reported by the authors as 0.76. The validity of the content of this tool was determined after translation and re-translation and application of experts' opinions, and Cronbach's alpha was 0.73 [17]. Diabetes self-management behavior was measured using the Summary of Diabetes Self-care Activities (SDSCA). The validity of the content of this tool was determined after translation and re-translation and use of experts' opinions, and Cronbach's alpha was 0.814. The SDSCA measure is a brief self-report questionnaire of diabetes self-management that includes items assessing the following aspects of the diabetes regimen: diet, physical activity and exercise, blood sugar testing, foot care, and medication. Scores are calculated for each of the five regimen areas assessed by the SDSCA: Diet, Exercise, Blood-Glucose Testing, Foot Care, and Medication [19].

Statistical analysis

The characteristics of the participants were summarized as proportions and means (SD, standard deviation). The significance of the observed differences was tested by analysis of covariance, paired t-test, chi-square and independent t-test. $P < 0.05$ was considered significant. Analyses were conducted using SPSS version 16.

Registrations and approvals

The Ethics Committee approved this study at the Tehran University of Medical Sciences (IR.TUMS.FNM.REC.1398.080). The study has been approved by TCTR Committee on 27 November 2022. The TCTR identification number is TCTR20221127001. All participants were informed of the study's objectives and gave written consent. Because of ethical consideration confidentiality of information and anonymity of data will be maintained. Initial data will not be disclosed because of fear of inappropriate use of data.

Results

During the study no sample was excluded. The mean (SD) age in the experimental group was 47.96 years and 48.68 years in the control group. Information about both groups, such as gender, education level, marital status, and employment status, are indicated in Table 1. Statistical significance was defined as $p < 0.05$ for the analysis. The results of Fisher's exact and chi-square tests showed that there was no significant difference between the control and experimental groups in terms of these characteristics.

Self-management behavior in diet dimension was 12.68 (2.20) in the experimental group and 11.98 (2.02) in the control group ($p = 0.102$). A significant increase

Table 2. Comparison of Self-Care Behaviors and Diabetes Knowledge in the Experimental and Control Groups

Variables	Mean (SD) Experimental group		Mean (SD) Control group		P-value*	
Self-care behaviors	**Before trial**	**2 months after trial**	**Before trial**	**2 months after trial**	**Before trial**	**2 months after trial**
Diet	12.68 (2.20)	26.36 (2.13)	11.98 (2.02)	11.66 (1.93)	0.102	< 0.001
P-value*	p < 0.001		p = .0369			
Physical activity and exercise	4.24 (1.04)	12.30 (1.29)	4.74 (1.10)	5.12 (1.06)	0.022	< 0.001
P-value*	p < 0.001		p = 0.095			
Blood sugar monitoring	4.18(0.89)	12.16 (1.41)	4.88(1.02)	4.52 (1.14)	< 0.001	< 0.001
P-value*	p < 0.001		p = 0.095			
Foot care	11.88 (1.78)	30.44 (2.052)	11.46 (1.98)	13.20 (2.34)	0.268	< 0.001
P-value*	p < 0.001		p < 0.001			
Drug use	2.54 (0.93)	6.14 (0.78)	2.36 (0.96)	2.86(1.48)	0.344	< 0.001
P-value*	p < 0.001		p = 0.055			
Diabetes knowledge	8.44 (1.37)	19.52 (2.04)	8.34 (1.55)	9.21 (2.05)	0.734	< 0.001
P-value*	p < 0.001		p = 0.013			

*P-values determined using independent t-test and paired-samples t-test

in diet dimension was observed in the experimental group 2 months later 26.36 (2.13) ($p < 0.001$). Self-management behavior in physical activity and exercise dimension was 4.24 (1.04) in the experimental group and 4.74 (1.10) in the control group ($p = 022$). A significant increase in physical activity and exercise dimension was observed in the experimental group 2 months later 12.30 (1.29) ($p < 0.001$). Self-management behavior in blood sugar monitoring dimension was 4.18 (0.89) in the experimental group and 4.88 (1.02) in the control group ($p < 0.001$). A significant increase in blood sugar monitoring dimension was observed in the experimental group 2 months later 12.16 (1.41) ($p < 0.001$). Self-management behavior in foot care dimension was 11.88 (1.78) in the experimental group and 11.46 (1.98) in the control group ($p = 0.26$). A significant increase in foot care dimension was observed in the experimental group 2 months later 30.44 (2.05) ($p < 0.001$). Self--management behavior in drug use dimension was 2.54 (0.93) in the experimental group and 2.36 (0.96) in the control group ($p = 0.34$). A significant increase in drug use dimension was observed in the experimental group 2 months later 6.14 (0.78) ($p < 0.001$) (Tab. 2).

The average diabetes knowledge was 8.44 (1.37) in the experimental and 8.34 (1.55) in control group ($p = 0/734$). After the trial, an increase was observed in the experimental group 19.52 (2.04) and in the control group 9.21 (2.05) ($p < 0/001$) (Tab. 2).

Findings showed no significant difference in the control group's mean diabetes knowledge and self-management behaviors in PWD before and two months after the intervention ($p > 0.05$). However, the results of paired t-test showed there was a significant difference in the mean diabetes knowledge and self-management behaviors in PWD in the experimental group before and two months after the intervention ($p < 0.05$) (Tab. 2).

Discussion

Diabetes is one of the main health problems in all countries, which World Health Organization (WHO) cited it as a silent epidemic. Self-management education is a critical element of the chronic care model, which has been shown to promote inter-disciplinary care and outcomes of chronic conditions like diabetes [20]. This study aimed to investigate the effects of a blended-learning approach on diabetes knowledge and self-management behavior in PWD. Patient education is considered one of the most economical and effective self-management behavior methods. There are many articles reporting different methods of patient education effective in attaining this goal in PWD [21–23].

Results indicate that the blended-learning approach promotes diabetes knowledge and self--management behaviors. This event was repeated in other studies, too. Khoshnoodi Far et al. (2019) [23] showed that the blended training method is more effective in increasing the self-care of patients with type 2 diabetes than the in-person training. In line with the present study, Farahani et al. (2020) [14] said that blended education effectively enhances patients' skills. Tol et al. [15] also investigated the effect of

a blended education program on anxiety among patients with orthopedic surgery; their study showed blending education can reduce anxiety ($p = 0.04$). Aghakhani et al. (2019) [24] significantly increased the total score of treatment concordance patients with hypertension after the blended education program. It is believed that blended learning appears to be more effective than no blended instruction [25].

However, in the study done by Lee et al. (2020) [16] aimed to assess the effects of the addition of electronic educational material to doctor's face-to-face education for HTN control, results indicated that the combination of the traditional doctor's face-to-face teaching and the electronic educational material had no additive effects for the HTN treatment. On the other hand, it seemed to produce possible subtractive results for blood pressure control, although the differences were not statistically significant. This dissimilarity can be related to the type of combination of patient education. Evidence showed that mixed e-learning and face-to-face training might promote knowledge dissemination and absorption. Proper communication and interaction with educators and peers are essential parts of the success of online learning. Also, e-learning could be used for conveying theoretical knowledge, while practical skills could be kept for in-person face-to-face training [26].

This research, like other studies, has limitations. The participants in this study were literate and had access to the Internet and the generalization of the results should be done with caution. So, to increase generalizability of findings, similar studies should be performed with more sample size and variety on a wider level. It is required that, taking into account educational considerations, various health education models are offered continuously.

Conclusions

This study showed the potential of a blended training program in assisting PWD with diabetes knowledge and self-management behaviors. Encouraging results from experienced PWD indicate that the course could have a more significant impact on patient empowerment. In conclusion, a blended education program is highly recommended to improve treatment adherence, with low medical costs for patients.

Strength and limitations

The strengths of the study include the randomized and single-blinded methodologies, and the limitations include unfollowing after two months. Exploring patients' experiences of blended training could show this approach's weakness and strangeness.

Acknowledgements

The authors would like to thank the participants for their cooperation in this study.

Conflict of interest

None declared.

REFERENCES

1. Boels AM, Rutten G, Zuithoff N, et al. Effectiveness of diabetes self-management education via a smartphone application in insulin treated type 2 diabetes patients - design of a randomised controlled trial ('TRIGGER study'). BMC Endocr Disord. 2018; 18(1): 74, doi: 10.1186/s12902-018-0304-9, indexed in Pubmed: 30348142.
2. Adu MD, Malabu UH, Malau-Aduli AEO, et al. Enablers and barriers to effective diabetes self-management: A multi-national investigation. PLoS One. 2019; 14(6): e0217771, doi: 10.1371/journal.pone.0217771, indexed in Pubmed: 31166971.
3. Mardanian Dehkordi L, Abdoli S. Diabetes Self-Management Education; Experience of People with Diabetes. J Caring Sci. 2017; 6(2): 111–118, doi: 10.15171/jcs.2017.011, indexed in Pubmed: 28680865.
4. Powers MA, Bardsley JK, Cypress M, et al. Diabetes Self-management Education and Support in Adults With Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. Diabetes Care. 2020; 43(7): 1636–1649, doi: 10.2337/dci20-0023, indexed in Pubmed: 32513817.
5. van Eikenhorst L, Taxis K, van Dijk L, et al. Pharmacist-Led Self-management Interventions to Improve Diabetes Outcomes. A Systematic Literature Review and Meta-Analysis. Front Pharmacol. 2017; 8: 891, doi: 10.3389/fphar.2017.00891, indexed in Pubmed: 29311916.
6. Gubitosi-Klug RA. DCCT/EDIC Research Group. The diabetes control and complications trial/epidemiology of diabetes interventions and complications study at 30 years: summary and future directions. Diabetes Care. 2014; 37(1): 44–49, doi: 10.2337/dc13-2148, indexed in Pubmed: 24356597.
7. Kim Y, Lee H, Seo JiM. Integrated Diabetes Self-Management Program Using Smartphone Application: A Randomized Controlled Trial. West J Nurs Res. 2022; 44(4): 383–394, doi: 10.1177/0193945921994912, indexed in Pubmed: 33655794.
8. Kumah E, Sciolli G, Toraldo ML, et al. The diabetes self-management educational programs and their integration in the usual care: A systematic literature review. Health Policy. 2018; 122(8): 866–877, doi: 10.1016/j.healthpol.2018.06.003, indexed in Pubmed: 30007520.
9. Rowland SP, Fitzgerald JE, Holme T, et al. What is the clinical value of mHealth for patients? NPJ Digit Med. 2020; 3: 4, doi: 10.1038/s41746-019-0206-x, indexed in Pubmed: 31970289.
10. Greenwood DA, Gee PM, Fatkin KJ, et al. A Systematic Review of Reviews Evaluating Technology-Enabled Diabetes Self-Management Education and Support. J Diabetes Sci Technol. 2017; 11(5): 1015–1027, doi: 10.1177/1932296817713506, indexed in Pubmed: 28560898.
11. Lawn S, Zhi X, Morello A. An integrative review of e-learning in the delivery of self-management support training for health professionals. BMC Med Educ. 2017; 17(1): 183, doi: 10.1186/s12909-017-1022-0, indexed in Pubmed: 29017521.
12. Malfliet A, Kregel J, Meeus M, et al. Blended-Learning Pain Neuroscience Education for People With Chronic Spinal Pain: Randomized

Controlled Multicenter Trial. Phys Ther. 2018; 98(5): 357–368, doi: 10.1093/ptj/pzx092, indexed in Pubmed: 29669079.
13. Vahed M, Hossain R, Min R, Yu R, Javed S, Nguyen T. The future of blended learning: a report for students and policy makers. Federation of Canadian Secondary Students 2017.
14. Farahani I, Laeer S, Farahani S, et al. Blended learning: Improving the diabetes mellitus counseling skills of German pharmacy students. Curr Pharm Teach Learn. 2020; 12(8): 963–974, doi: 10.1016/j.cptl.2020.04.016, indexed in Pubmed: 32564999.
15. Tol A, Shahri Pardel M, Esmaelee Shahmirzadi S, et al. Effect of blended education program on anxiety among orthopedic patients surgery. J Nurs Educ. 2013; 2(3): 1–8.
16. Lee JY, Tang D, Xiao X, et al. Addition of the Electronic Educational Material to Doctor's Face-to-Face Education Has No Additive Effects on Hypertension Control: A Randomized Single Blind Study. Int J Hypertens. 2020; 2020: 8275945, doi: 10.1155/2020/8275945, indexed in Pubmed: 33014452.
17. Eigenmann CA, Skinner T, Colagiuri R. Development and validation of a diabetes knowledge questionnaire. Practical Diabetes International. 2011; 28(4), doi: 10.1002/pdi.1586.
18. Reisi M, Mostafavi F, Javadzade H, et al. Impact of Health Literacy, Self-efficacy, and Outcome Expectations on Adherence to Self-care Behaviors in Iranians with Type 2 Diabetes. Oman Med J. 2016; 31(1): 52–59, doi: 10.5001/omj.2016.10, indexed in Pubmed: 26813680.
19. Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. Diabetes Care. 2000; 23(7): 943–950, doi: 10.2337/diacare.23.7.943, indexed in Pubmed: 10895844.
20. Lamptey R, Robben MP, Amoakoh-Coleman M, et al. Structured diabetes self-management education and glycaemic control in low- and middle-income countries: A systematic review. Diabet Med. 2022; 39(8): e14812, doi: 10.1111/dme.14812, indexed in Pubmed: 35179792.
21. Nwankwo CU, Ezenwaka CE, Onuoha PC, et al. Implementing diabetes self-management education (DSME) in a Nigerian population: perceptions of practice nurses and dieticians. Arch Physiol Biochem. 2015; 121(3): 123–127, doi: 10.3109/13813455.2015.1031140, indexed in Pubmed: 26112931.
22. Gathu CW, Shabani J, Kunyiha N, et al. Effect of diabetes self-management education on glycaemic control among type 2 diabetic patients at a family medicine clinic in Kenya: A randomised controlled trial. Afr J Prim Health Care Fam Med. 2018; 10(1): e1–e9, doi: 10.4102/phcfm.v10i1.1762, indexed in Pubmed: 30456964.
23. Khoshnoodi far M, Arabnezhad Z, Tehrani H, et al. The effect Blended training on comparison with in-person training on self-care behaviors in type 2 diabetes patients. Iran J Health Educ Health Promot. 2019; 7(4): 333–342, doi: 10.29252/ijhehp.7.4.333.
24. Aghakhani N, Parizad N, Soltani B, et al. The effect of the blended education program on treatment concordance of patients with hypertension: A single-blind randomized, controlled trial. J Vasc Nurs. 2019; 37(4): 250–256, doi: 10.1016/j.jvn.2019.08.001, indexed in Pubmed: 31847979.
25. Liu Q, Peng W, Zhang F, et al. The Effectiveness of Blended Learning in Health Professions: Systematic Review and Meta-Analysis. J Med Internet Res. 2016; 18(1): e2, doi: 10.2196/jmir.4807, indexed in Pubmed: 26729058.
26. Yu CC, Le KM, Low JA. Community nurses' perspectives on a novel blended training approach: a qualitative study. BMC Nurs. 2022; 21(1): 113, doi: 10.1186/s12912-022-00893-3, indexed in Pubmed: 35550068.