Available *online* at : http://ejurnal.stikesprimanusantara.ac.id/

Jurnal Kesehatan

| ISSN (Print) 2085-7098 | ISSN (Online) 2657-1366 |

Improving Self-Care Behavior of Elderly Group with Diabetes Mellitus through Diabetes Self Management Intervention

T. Widya Naralia[1]*, Raphita Diorarta[2], Masyithah Fadhani[3], Junaiti Sahar[4]

[1,2] Departement of Nursing, Faculty of Health Science, Universitas Pembangunan Nasional "Veteran" Jakarta

[3] Departement of Nursing, Faculty of Nursing and Public Health, Universitas Prima Nusantara Bukittinggi

[4] Departemen of Nursing, Faculty of Nursing, Universitas Indonesia

ARTICLE INFORMATION

Received: 16 April 2024
Revised: 18 Maret 2024
Accepted: 20 Juni 2024
Available online: 30 Juli 2024

KEYWORDS

Diabetes mellitus, Elderly, Chair Based Exercise

CORRESPONDING AUTHOR

Name: T. Widya Naralia

E-mail: widyanaralia@upnvj.ac.id

ABSTRACT

Background: The elderly are one of the age groups that are easily affected by diabetes mellitus due to the decline in organ function and unhealthy lifestyles. Self-care management of diabetes is crucial for helping to control the blood glucose levels of individuals with diabetes mellitus. Self-care management can be carried out through education, discussions, and the practice of physical exercise to regulate blood glucose levels. The implementation of self-care management interventions is considered effective when conducted in groups among the elderly.

Purpose: This research aims to observe changes in the knowledge and attitudes of the elderly, as well as changes in their independence skills.

Methods: The implementation of the Diabetes Self-Management intervention was carried out on 33 elderly individuals with diabetes who were organized into one group. The intervention was conducted over 12-14 weeks, which included education, simulation, and chair-based exercise (CBE) training performed once a week consecutively.. This research uses a pre-post group design with t-test analysis to determine changes in the self-care behavior of group members.

Results: There was an increase in the average score of 1.54 in the knowledge domain, and an average score of 5.18 in the attitude domain. Additionally, there was a decrease in the average blood glucose level of 61.61 mg/dL in the elderly group with diabetes mellitus. Other improvements were also observed in the changes in the Functional Independence variables for motoric and cognitive functions.

Conclusion: Diabetes self-management intervention has become one of the effective strategies that can be implemented in elderly groups with diabetes in the community.

INTRODUCTION

Currently, the number of people with Diabetes Mellitus (DM) continues to increase. Data from the International Diabetes Federation (IDF) in 2021 states that 3 out of 4 adults and elderly people in developing countries have been diagnosed with DM. The incidence of DM disease at the age of > 20 years is recorded to have reached 537 million people in 2021 worldwide. Indonesia is ranked fifth highest as a country with DM sufferers in the world with 15.9 million people with DM (1). This is very unfortunate, especially since this deadly chronic disease should be preventable. IDF states that there are 14.3 million Indonesians aged 20-79 years who are not diagnosed with DM but have felt the typical symptoms of diabetes mellitus and are not aware of this. The data shows that the number of DM cases in Indonesia is even higher than the current data.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

The older a person gets, the higher the risk of developing DM (elderly statistics). The occurrence of T2DM in the elderly is exacerbated by the decline in multiorgan function due to degenerative processes. Prolonged hyperglycemic conditions will cause worsening of the circulatory system, musculoskeletal to disrupt the cognitive process of the elderly and reduce their quality of life. The causes of DM due to the aging process cannot be stopped, only lifestyle factors can be changed to reduce the impact of worsening diabetes mellitus. DM self-management in the elderly includes several things, namely increasing knowledge related to DM, changing lifestyles with nutritional management, increasing appropriate physical activity, managing stress and controlling blood glucose levels (4,5). Research on Diabetes Self Management conducted on 48 adults showed that there was an increase in knowledge and changes in self-care behavior for the better ($p = 0.00$) (6). One of the appropriate strategies for intervention for the elderly is to form a DM elderly self-help group or self help group (SHG). A study on group intervention in the elderly showed that the elderly felt less lonely and more enthusiastic in carrying out therapy together. Group interventions aim to increase the motivation of the elderly and the consistency of the elderly in following the DM self-care program.

METHOD

This study used a case study research design in a group of elderly people with diabetes mellitus. The selection of participants was carried out using purposive sampling technique with inclusion criteria, namely the elderly diagnosed with diabetes mellitus, able to mobilize, and the elderly can communicate well and cooperatively. The total members of the DM elderly group were 33 DM elderly people in one pre-post intervention group without a control group. This study was conducted in Cimanggis District, Depok City for 12 consecutive weeks. The assessment was conducted in November 2021 and the evaluation was conducted in April 2022.

The interventions carried out are education about DM disease and physical exercise combined with relaxation techniques. The education provided is about the causes, signs and symptoms, emergencies of Diabetes Mellitus disease to self-care that can be done by the elderly and family. Educational topics also include nutrition for people with DM, appropriate physical exercise for the elderly to facts and myths circulating in the community about DM. Education is delivered with visual and audiovisual media or with videos. Researchers provide videos about the negative impact of diabetes complications and motivational videos from DM patients who can control their blood glucose.

Education was conducted on all group members who were gathered once a week for 12-14 weeks. In a week the researchers conducted 2 meeting sessions with the same educational topic, the elderly could choose their schedule to participate in the educational activities according to their free time. The duration of the delivery of educational topics is carried out for 45-60 minutes along with discussion. Before the intervention program began, all group members were assessed for their level of knowledge and attitude regarding DM self-care. The instrument to measure knowledge used is the standardized Diabetes Knowledge Questionnaire (7) of 13 questions and to measure attitudes is the Diabetes Care questionnaire (8) of 16 questions.

Another intervention that was carried out was Chair Based Exercise (CBE), which is physical exercise in a sitting position using elastic bandage or elastic rubber. This exercise is combined with relaxation music that accompanies during the exercise. The relaxation music is instrumental music of the sound of nature, water or the atmosphere in the forest. The duration of the CBE exercise is 45 minutes. This exercise is focused on training the muscle strength of the elderly by sitting then pulling the elastic rubber according to the stages and directions of the instructor, or the thighs and legs that move to tighten the elastic rubber. CBE exercises are carried out once a week with a total of 12 meetings during the program. The education schedule is always different from the CBE exercise schedule to avoid fatigue in the elderly. Before the CBE Exercise program was implemented, participants were assessed for motor function ability using the Functional Independence Measurement (FIM) instrument to determine changes in motor and cognitive function status of the DM elderly group.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

The elderly have been facilitated with a reclining chair and elastic rubber, the researcher has prepared a video to be viewed together while listening to the sounds of nature from the video. At the end of the exercise, the researcher led the elderly to do the deep breath relaxation technique together. The elderly were then given a guidebook and elastic rubber to do CBE exercises at home. Every time the CBE exercise activity with relaxation music was completed, the researcher conducted a subjective evaluation by asking what the elderly felt after doing physical exercise. To assess changes in blood glucose, the researcher also checked blood glucose levels at the first time before the intervention program was carried out, in the middle of the intervention program and at the end of the meeting. This research has obtained permission from the health center and Curug Village, Cimanggis District, Depok City.

RESULT DAN DISCUSSION

Data from 33 elderly people obtained were male elderly as much as 21% and female elderly as much as 79%. The majority of DM elderly are in the age range of 60 - 74 years (elderly), namely 90% and DM elderly in the age range of 75 - 85 years (middle elderly) by 10% with an average age of 65.6 years. All elderly people are Muslim, 55% of the elderly are Sundanese and 45% are Betawi, all elderly people are no longer working with their daily activities being taking care of the household and gardening. The majority of elderly people have basic education up to high school and only 9% of elderly people have a college education. The average elderly person has retired from work and the source of livelihood is from pension money and assistance from children and other family members.

Surveys conducted in Indonesia show that 99.6% of elderly people in Indonesia who have diabetes mellitus are in the age range of 48.9 years to 67.9 years (25). Various studies also show that the female elderly population dominates DM compared to men. One study showed that 42.86% of DM sufferers were elderly women. However, other research states that the female gender is at less risk of developing diabetes because they have less testosterone (Simmons, 2021). Furthermore, previous research states that the dominant testosterone hormone in men will increase the risk of developing DM higher, but the severity of DM in women is actually much more severe than in men (25). Testosterone plays a role in fat storage and accumulation for men, which will then increase the risk of DM in men.

Table 1. Knowledge and Attitudes Toward Self-Care Before and After Diabetes Self Management Intervention

Variable	Mean	SD	Beda Mean	P *Value*
Knowledge of Self-Care				
Before Intervention	8	1,65	1,54	0.000
After Intervention	9,54	1,45		
Self-Care Attitude				
Before Intervention	38,45	7,62	5,18	0.000
After Intervention	43,63	5,34		

Through table 1 it can be seen that the average knowledge of the elderly before the intervention was 8 then after the intervention it rose to 9.54. This shows a change in knowledge for the better with an increase of 1.54. The value of the attitude variable can be seen before the intervention is 38.45 and after the intervention it rises to 43.63. This shows a change in the attitude of elderly DM in better self-care with an increase of 5.18.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

Based on the results of interviews, the cause of the low attitude of DM elderly in carrying out self-care is the difficulty of the elderly changing the habits that have been carried out daily. DM elderly are accustomed to consuming breakfast such as vegetable rice cake by drinking sweet tea, some other elderly people say they are accustomed to consuming sweetened condensed milk and consuming milk coffee up to 3 times a day. Not only the type of food that is inappropriate but also the pattern and schedule of consuming elderly food is also inappropriate. Some elderly people stated that they often delayed eating and then combined the lunch consumption schedule with dinner in the afternoon and added the portion of food consumed. The majority of the elderly also stated that they were not accustomed to consuming snacks, so that the portion of the main meal would be much more.

In addition to a poor diet, the elderly also stated that they never participated in gymnastics that had been held by health cadres every week because they felt unable to follow the fast gymnastic movements. The elderly also think that if they have done daily activities such as cleaning the house, sweeping the yard, washing dishes is included in exercise so that the elderly feel no need to exercise. The majority of the elderly do not have activities that consume energy so that the lack of movement causes blood glucose levels to remain high. The elderly expressed their desire to participate in sports activities that are in accordance with their physical abilities.

Researchers deliver education by displaying materials and playing videos about DM disease, DM complications and motivational videos from DM patients who are able to live a healthy life and control their blood glucose. A study on the comparison between video health education vs face-to-face health education showed that there was no significant difference in the results of changes in HbA1C levels of DM patients after the intervention for 3-6 months (9). Furthermore, Molavynejad et al. explained that the educational method only with video should actually remain under monitoring by the educator, because each client's understanding of the video cannot be generalized (9). Meanwhile, other research results state that there is a significant difference in the intervention group given DM treatment plus educational videos compared to the DM group with only treatment without videos (10). The intervention group with treatment plus video showed a change in DM self-management behavior that was better than the control group. Video can be used as a medium for health education interventions that can facilitate nurses in providing interventions and help families to repeat the educational material that has been given (10).

The researcher focused on increasing fiber for people with DM. Fiber is very useful because it prolongs gastric emptying, prevents constipation, lowers blood cholesterol levels, thus reducing blood glucose response. A low-fat diet is recommended for diabetics to achieve and maintain ideal body weight and good health. Further analysis based on research conducted by Muhammed et al., stated that the fulfillment of proper nutrition for people with DM is 30% of daily calories should come from fat, and less than 10% is saturated fat, less than 10% polyunsaturated fat and 10-15% monounsaturated fat. Both soluble and insoluble fiber are at least in the amount of 20 grams -35 grams per day (14). Diabetics do not need supplements or additional vitamins and minerals if their food intake is sufficient with the right food composition.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

Table 2. Results of Blood Glucose Level Examination Before and After Intervention

Variable	Mean	SD	Beda Mean	P *Value*
Blood Glucose Level at the Moment				
Before Intervention	247,09	80,14	61,61	0.000
After Intervention	185,48	36,72		

The results of the examination obtained the highest value of GDS was 489 mg/dL and the lowest value was 170 mg/dL with an average value before the intervention was 247.09 mg/dL decreasing to 185.48 mg/dL. This shows that there is an improvement in the behavior of the elderly in implementing lifestyle changes obtained through education provided by researchers. The results of his research on nutritional regulation interventions for fruit and vegetable consumption showed that the average consumption of vegetables reported from the sample increased from the initial 1.07 daily servings to 2.17 servings four weeks after the intervention, or an increase of 50.7%, and the average fruit consumption increased by 44.2%, from 1.21 servings daily to 2.17 servings daily (11). This is in accordance with PERKENI (2020) which explains that fiber is the main component of food that must be increased by people with DM with a minimum dose of 20-35 grams per day (15). Recommended fiber is food sourced from nuts, fruits and vegetables. The selection of appropriate nutrition for T2DM elderly in the family is prioritized on increasing the consumption of fruits and vegetables with a low sugar glycemic index content.

Table 3. Results of Functional Independence Measurement (FIM) Before and After Intervention

Variable	Mean	SD	Beda Mean	P *Value*
FIM Motor Skills Variable				
Before Intervention	81,51	9,44	3,76	0.000
After Intervention	85,27	6,30		
Cognitive Variable FIM				
Before Intervention	32,69	2,77	0,82	0.002
After Intervention	33,51	2,09		

From Table 3, it can be seen that the results of measurements with the Functional Independence Measurement (FIM) instrument show that there is an average difference of 3.77 in the Motor variable before and after the intervention. While in cognitive variables there is an average difference of 0.82 before and after the intervention. Chair Based Exercise (CBE) is one of the right physical exercises done in a sitting position and doing physical stretching movements with or without tools for the elderly who are unable to stand for a long time and are unable to follow physical exercise with fast and heavy movements (17). CBE has often been carried out for the elderly with limited mobility with the scope of home care and is appropriate to be carried out in community groups (16). The benefits of physical exercise interventions with the Chair Based Exercise method have been studied to provide many benefits in improving muscle and bone strength in the elderly with physical weakness, balance and walking ability to provide relaxation effects, improved sleep quality and mental health.

Previous research on consistently practiced Chair Yoga includes 6 phases: centering or focus, warming up, core movements, cooling down, praying, and meditation. (18). In the study, functional status was measured using the FIM instrument

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

before intervening in the group of frail elderly individuals with chronic diseases. The average age of the participants is 66 years, with a functional status decline of 122.48. After the intervention, there was an increase in functional status to 124.60 in the intervention group. The movement of yoga is essentially a slow and steady muscle stretching movement, which is similar to the principles of CBE movement. However, in the yoga practice, there is an element of meditation at the end of its stages. The yoga practice conducted with elderly individuals suffering from osteoarthritis showed results in the reduction of symptoms and pain complaints, as well as an improvement in physical mobility.

CBE therapy is also considered effective for the elderly using wheelchairs. According to the research by Chen et al., physical exercise using elastic bands performed for 40 minutes three times a week has a positive effect on improving functional daily activities, lung capacity, body flexibility, and the strength and endurance of the lower limb muscles. (19). Further analysis shows that CBE combined with relaxation music is one of the appropriate physical exercises for elderly individuals with diabetes mellitus, especially those with weakness in their legs.

Music therapy with natural sounds plays a role through the melodies that stimulate the hypothalamus as the center for regulating the body's mechanisms, making the brain relax and helping to cope with anxiety. This is supported by demonstrating the influence of nature sound therapy on the anxiety levels of the elderly. (20). This nature sound therapy also has dual benefits as a component of meditation and relaxation. It has been proven to enhance physiological and psychological well-being in the elderly population. The expected outcomes include improvements in cardio-autonomic, pulmonary, neurocognitive, and psychological functions. (21). The addition of relaxation exercises can also reduce blood pressure and blood sugar levels in the elderly.

Relaxation techniques are a non-drug intervention that can reduce despair or psychological disorders experienced by the elderly. This technique is very beneficial and has many positive effects on the elderly, and it is an easy technique to apply for the elderly group. This technique provides benefits and influences psychological health in the elderly, such as stress or anxiety disorders that lead to sleep disturbances. A relaxation technique that is easy for the elderly to perform could be deep breathing relaxation, which can reduce stress or psychological issues like despair. This is because deep breathing relaxation can increase oxygen and nutrients; the increased oxygen in the brain stimulates the secretion of serotonin, which makes the body relaxed and at ease. That situation ultimately lowers the pulse and blood pressure, which can reduce the existing stress levels (23).

CONCLUSION

Diabetes self-management intervention has become one of the effective strategies that can be implemented in elderly groups with diabetes in the community. There was a change in behavior, specifically in the dimensions of knowledge and attitude, after the educational intervention, group discussions, and simulations were conducted over 12 weeks. In addition to behavioral changes, the elderly also experience improvements in motor and cognitive functions after consistently participating in chair-based exercise group activities. The results of the blood glucose level examination at that time also showed a significant decrease after the intervention. The implementation of this intervention could be an option to be carried out for elderly groups with diabetes in the future.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

ACKNOWLEDGEMENT

We would like to thank the elderly group with diabetes who have agreed to be respondents, as well as the health cadres who have assisted in the activities of the group in Curug Village.

REFERENCE

1. IDF Diabetes Atlas 10th edition [Internet]. Available from: www.diabetesatlas.org
2. Paolisso G. Pathophysiology of diabetes in elderly people. Acta Biomedica. 2010;81(SUPPL. 1):47–53.
3. Lee PG, Halter JB. The pathophysiology of hyperglycemia in older adults: Clinical considerations. Diabetes Care. 2017;40(4):444–52.
4. McClinchy J. Dietary management of older people with diabetes. British Journal of Community Nursing. 2018;23(5):248–51.
5. IDF. International Diabetes Federation. Vol. 266, The Lancet. 2019. 134–137 p.
6. Kartika AW, W W, Rekawati E. Diabetes Self-Management Education (DSME) Intervention to Improve Self-Care Management of Diabetes Mellitus Patients. Jurnal Ilmu Keperawatan (Journal of Nursing Science) [Internet]. 2013 Jan 1;9(2):151–7. Available from: https://jik.ub.ac.id/index.php/jik/article/view/431
7. Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Hakk T. The Diabetes Self-Management Questionnaire (DSMQ). Journal Health and Quality of Life Outcomes. 2013;11(1):1.
8. Garcia AA, Villagomez ET, Brown SA, Kouzekanani K, Hanis CL. The Starr County Diabetes Education Study. Diabetes Care. 2001;24(1):16–21.
9. Molavynejad S, Miladinia M, Jahangiri M. A randomized trial of comparing video telecare education vs. in-person education on dietary regimen compliance in patients with type 2 diabetes mellitus: a support for clinical telehealth Providers. BMC Endocrine Disorders. 2022;22(1):1–10.
10. Pai LW, Chiu SC, Liu HL, Chen LL, Peng T. Effects of a health education technology program on long-term glycemic control and self-management ability of adults with type 2 diabetes: A randomized controlled trial. Diabetes Research and Clinical Practice. 2021;175(100):108785.
11. Torres D. Effectiveness of a Nutritional Education Intervention on Increasing Fruit and Vegetable Consumption in Adults with Type 2 Diabetes. ProQuest Dissertations and Theses. 2018;105.
12. PERKENI. Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia 2015. (2015). PB PERKENI. Global Initiative for Asthma. 2020;46.
13. Van den Elzen N, Daman V, Duijkers M, Otte K, Wijnhoven E, Timmerman H, et al. The power of music: Enhancing muscle strength in older people. Healthcare (Switzerland). 2019;7(3):1–8.
14. Muhammed, D., Adebiyi, Y. H., Odey, B. O., Ibrahim, J., Hassan, O. N., Ugwunnaji, P. I., & Berinyuy, E. B. Nutritional Management of Diabetes Mellitus: An appraisal of the role of Medicinal plants. *AROC in Natural Products Research*, *01*(01), 01–27. 2021. https://doi.org/10.53858/arocnpr01010127
15. PERKENI. Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia. 2020. PB PERKENI. *Global Initiative for Asthma*, 46. www.ginasthma.org.
16. Smith J, Petrovic P, Rose M, De Souz C, Muller L, Nowak B, et al. Placeholder Text: A Study. Citation Styles. 2021 Jul 15;3.

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163

17. Stojanović MDM, Mikić M, Milošević Z, Vuković J, Jezdimirović T, Vučetić V. Effects of chair-based, low–load elastic band resistance training on functional fitness and metabolic biomarkers in older women. J Sports Sci Med. 2021;20(1):133–41.
18. Kertapati Y, Sahar J, Nursasi AY. The effects of chair yoga with spiritual intervention on the functional status of older adults. Enferm Clin [Internet]. 2018;28:70–3. Available from: http://dx.doi.org/10.1016/S1130-8621(18)30040-8
19. Chen KM, Li CH, Chang YH, Huang HT, Cheng YY. An elastic band exercise program for older adults using wheelchairs in Taiwan nursing homes: A cluster randomized trial. Int J Nurs Stud [Internet]. 2015;52(1):30–8. Available from: http://dx.doi.org/10.1016/j.ijnurstu.2014.06.005
20. Akhriansyah M, Surahmat R, Agustina N, Rusmarita R. Implementasi Terapi Musik Nature Sound kepada Lansia untuk Mengatasi Ansietas. J Abdimas Kesehat. 2024;6(2):350.
21. S. P, V. N, S. P, J. T, V. S, A. A, et al. Effect of mind sound resonance technique on physiological and psychological parameters among geriatric population: a structured study protocol for a randomized controlled trial. Int J Clin Trials. 2024;11(3):224–30.
22. Elliya R, Sari Y, Chrisanto EY. Keefektifan relaksasi nafas dalam terhadap penurunan stres pada lansia di UPTD Pelayanan Sosial Lanjut Usia Tresna Werdha Natar Lampung Selatan. Malahayati Nurs J. 2021;3(1):50-60. doi:10.33024/manuju.v3i1.1624.
23. Azhar A, Dekawaty A, Yuniza. Pengaruh Terapi Relaksasi Nafas Dalam Terhadap Stres pada Lansia The Effect of Deep Breathing Relaxation Therapy on Stress in the Elderly. J Inspirasi Kesehat. 2023;1(1):72–9.
24. Simmons, H. Diabetes in Men versus Women. In *News Medical Life Sciences*. 2021. https://www.news-medical.net/health/Diabetes-in-Men-versus-Women.aspx

DOI: http://dx.doi.org/10.35730/jk.v%vi%i.1163