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Original Article

The Effects of a Tele-nursing Educational Support Program Based on the COPE Care Model on Health Literacy among Family Caregivers of Elderly Patients with Type 2 Diabetes Mellitus: A Clinical Trial

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Abstract

Introduction: Improving health literacy among caregivers of elderly people with type 2 diabetes mellitus is of great importance. The present study aimed to determine the effects of a tele-nursing educational support program based on the COPE care model on the health literacy level of family caregivers of elderly people with type 2 diabetes mellitus.

Methods: In this clinical trial, a total of 90 family caregivers of elderly people with type 2 diabetes mellitus in Shahrekord city in 2024-2025 were included in the sampling after obtaining informed consent and then randomly divided into two intervention (45 people) and control groups (45 people). Caregivers in the intervention group participated in 6 training sessions based on the COPE model. Additionally, follow-ups were conducted by the researcher through WhatsApp groups for one month. The health literacy level of the samples was examined using the TOFLA Health Literacy Questionnaire. The obtained data were analyzed using SPSS software at a significance level of 0.05.

Results: The mean health literacy scores of caregivers in the intervention and control groups before the study were 43.72 ± 4.41 and 42.13 ± 4.35, respectively, which were not significantly different. However, the mean health literacy scores in the intervention and control groups 3 months after the intervention were 53.86 ± 5.76 and 42.19 ± 4.38, respectively, which were significantly different ($P \leq 0.001$).

Conclusion: It is recommended that educational interventions based on the COPE model be implemented to improve the level of health literacy among caregivers of elderly people with type 2 diabetes mellitus.

Keywords: Education, COPE model, Health literacy, Elderly, Diabetes

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Introduction

Aging is a natural biological process and an undeniable part of life (1). Estimates show that elderly population will reach 16% of the global population by 2050 in developing countries (2). The elderly is among the high-risk groups exposed to various chronic diseases, including diabetes mellitus (3).

Today, the diabetes mellitus is one of the most important causes of mortality and disability and one of the most escalating public health disabilities in the world (4, 5).

Given that the health of chronic patients, such as elderly diabetics, depends on the health of their caregivers, it is particularly important to monitor and pay attention to the health of caregivers of these patients. It can be said that the closer the patient's relationship with the caregiver, the more challenges and problems caregivers face (6). Family members are the primary group of informal caregivers (7, 8). According to statistics reported in the United States, more than 400 million adults serve as caregivers in the family (9).

One of the most influential factors in improving the health of family caregivers is their level of health literacy, which leads to an increase in the caregivers' sense of responsibility. According to the World Health Organization, health literacy, as one of the most important factors of health in the 21st century, includes the cognitive and social skills of individuals that determine their motivation and ability to access, understand, and use information and lead to the use of methods that improve their health (10).

Interventions aimed at improving health literacy can provide a new and complementary approach for

families dealing with chronic conditions. Health literacy is an important mediator in the effectiveness of health education interventions (11, 12). One family-centered educational support program is the COPE model. The COPE model has 4 main components: Creativity, Optimism, Planning, and Export Information (12). This model emphasizes creative thinking to view problems in new ways, maintaining an optimistic attitude, creating plans to solve problems, and learning how to follow up on expert information (13, 14).

One of the main duties of nurses is to help families improve their abilities to cope with actual and potential problems, because the family is an essential member of the caregiving process and continues the nurse's path. In the last century, attention to family health has become an important issue for the medical profession, especially nurses. The health of family members leads to better patient care and greater benefits for the patient (15).

Considering the growing trend of the elderly population in Iran and the importance of improving the health literacy level of caregivers of elderly people with type 2 diabetes mellitus, the aim of the present study was to determine the effects of the tele-nursing educational support program of the COPE care model on the health literacy level of family caregivers of elderly people with type 2 diabetes mellitus.

Materials and Methods

In this clinical trial, a total of 90 family caregivers of elderly people with type 2 diabetes mellitus in Shahrekord city in 2024-2025 were included in the study after obtaining informed consent through a convenience sampling method. Then, they were randomly divided into 2 intervention (45 people) and control (45 people) groups. In this study, considering a 10% drop-out rate, the sample size was calculated to be 90 people using the following formula (13). The sample size in each group (intervention group and control group) was calculated to be 41 people, and considering a 10% dropout rate, it was determined to be 45 people in each group (Figure 1).

$$m_{Variances\ Unequal} = \left[\frac{\tau+\varphi}{\varphi}\right]\frac{\left(Z_{1-a/2}+Z_{1-\beta}\right)^2}{\Delta^2_{Variances\ Unequal}} + \frac{\left(\tau^2+\varphi^3\right)z^2_{1-a/2}}{2\varphi\left(\tau+\varphi\right)^2}$$

$$\Delta_{Variances\ Unequal} = \frac{\mu_2-\mu_1}{\sigma_1}$$

$$\sigma_2^2 = \tau\sigma_1^2$$

$$\Delta = \frac{29.55-38.77}{15.38} = -0.599$$

$$\tau = \frac{15.38}{18.53} = 0.83$$

Caregivers in the intervention group participated in 6 training sessions based on the COPE model. Follow-ups

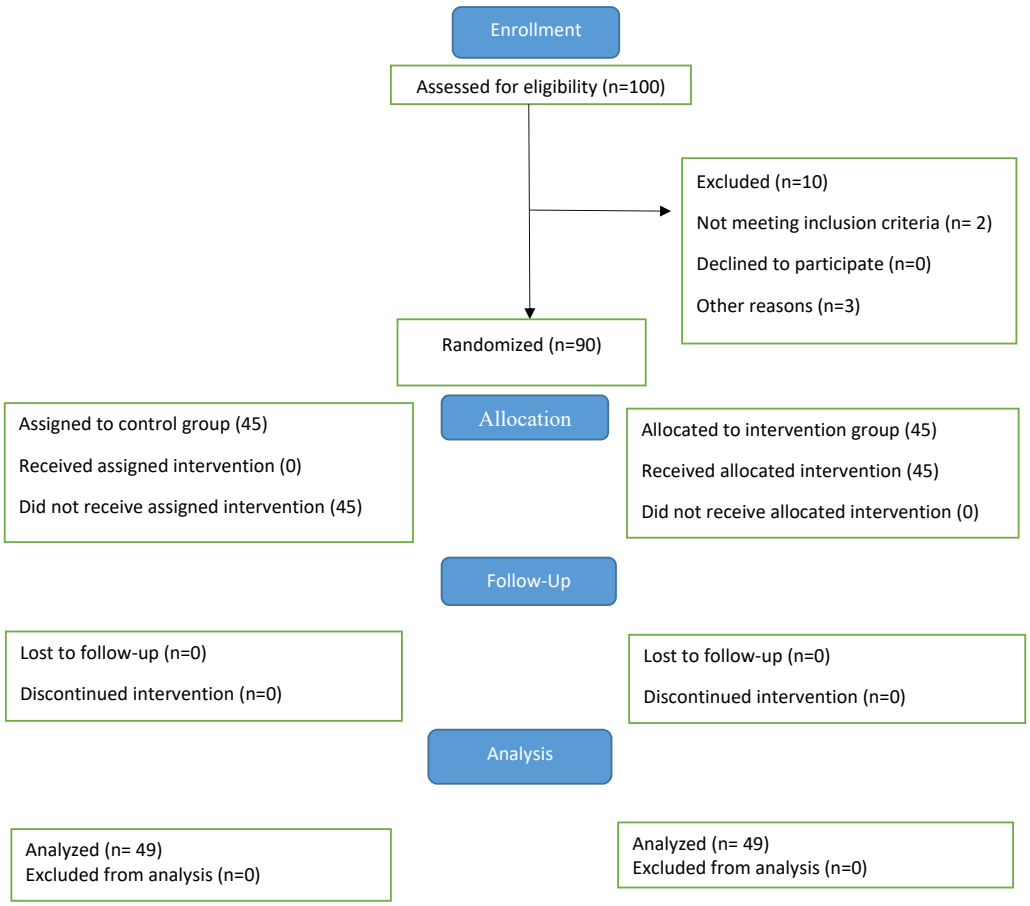

Figure 1. Sampling Flowchart

were also conducted by the researcher through WhatsApp groups for one month. The health literacy level of the samples was assessed using the TOFLA health literacy questionnaire. Data were analyzed using SPSS software at a significance level of 0.05.

In this study, the research process included observing the aspects of research ethics, providing written research permission from the Vice Chancellor of Research of Islamic Azad University, Shahrekord Branch, receiving ethical approval from the Ethics Committee (IR.IAU.SHK.REC.1403.402), obtaining Written informed consent, and ensuring the anonymity of questionnaires and confidentiality of information. In addition, pre-test and post-test were conducted before and after each period to minimize the possibility of information exchange and the influence of the two groups.

The inclusion criteria for the study included willingness to participate in the study, the caregiver's age being over 18 years and under 60 years, type 2 diabetes mellitus based on physician diagnosis, the caregiver not being a member of the health team, the ability to read and write in Persian, not participating in another similar study at the same time, the individual being designated as the primary caregiver by the patient, and the patient under care being an elderly person with type 2 diabetes mellitus. The exclusion criteria for the study included withdrawal of cooperation, the patient's death during the study, and the caregiver's failure to participate in a telephone session or a face-to-face meeting.

The data collection tools in this study included a questionnaire on family caregivers' demographic information (age, gender, education, marital status, and occupation) and the Test of Functional Health Literacy in Adults. The TOFLA consists of two sections: numerical comprehension and reading comprehension. The individual's score in the reading comprehension and numerical comprehension sections was considered to be between 0-50 each. The total health literacy score, ranging between 0 and 100, was obtained from the sum of the scores in these two sections. A score of 0-59 was considered insufficient health literacy, a score of 60-74 was considered borderline health literacy, and 100-74 was considered adequate health literacy. The validity and reliability of this questionnaire in Iranian society have been confirmed in previous studies. Cronbach's alpha values for the calculation section and for the reading comprehension section were 79% and 88%, respectively. The validity of the questionnaire was assessed by Tehrani et al by administering the questionnaire to 50 people in the first preliminary study. Then, considering the difficulty of the questions and the variance of the answers, some changes were made to some of the options, and the second preliminary study was conducted on 50 people. In order to monitor and control the quality of the design, 10% of the questions of each questionnaire were monitored in person at the same time as the data collection phase. Moreover, after collecting data in the field, the spotting team conducted a content spotting on all the collected questionnaires to identify information deficiencies, unrealistic measures, and invalid codes. Data analysis was performed using SPSS version 12 and STAT version 8. The health literacy score of each person ranged from 0 to 100, which was divided into 3 levels of insufficient, borderline, and sufficient based on the cut-off points of 59 and 74 (16).

Then, demographic and health literacy questionnaires were completed by the researcher for both groups. The time to complete the questionnaires took about 15-25 minutes for each individual. The caregivers in the intervention group participated in 6 training sessions that were planned based on the COPE model. The training sessions were held in 9 groups of five people. Two sessions were held in person at health centers in Shahrekord for 1 hour and 4 sessions were held by phone for 30 minutes. Follow-ups were also conducted by the researcher through WhatsApp groups for a month. The researcher and the caregivers reached a consensus on the time of the sessions. In-person sessions, issues such as determining the caregivers' problem regarding care and care challenges in elderly people with diabetes mellitus, prioritizing problems, explaining and reviewing the problem-solving process based on the 4 main components of the COPE model (creativity, optimism, planning, and specialized information), applying the problem-solving process based on the COPE model to the problem, brainstorming by the researcher for caregivers, explaining the identified problem, choosing the appropriate solution using lecture techniques, questions and answers, educational images, and an educational booklet, choosing a person who can help them solve the problem (nurse, doctor, and other people), developing a plan, and consulting to determine the time of the next session were discussed (Table 1).

Three months after the intervention, the questionnaires were completed again by the researcher in both groups. In the control group, the caregivers were given necessary and routine care and training.

Finally, the obtained data were analyzed using descriptive statistics (frequency, mean, and standard deviation) and inferential statistics (Chi-square, independent *t*-test, and paired *t*-test) in SPSS software version 21.0 and a significance level of 0.05.

Results

In this study, 90 family caregivers of elderly people with type 2 diabetes mellitus, were studied in the two groups: control (45 individuals) and intervention (45 individuals). Of the 90 participants included in the study, none dropped out during the intervention.

It is worth noting that the criterion of normal distribution of scores was met for the use of parametric tests using the Kolmogorov-Smirnov test ($P>0.05$).

The mean age of participants in the intervention group was 39.64 ± 2.83 and it was 39.53 ± 2.54 years in the control group. According to the Chi-square test, there was no statistically significant difference between the two intervention and control groups in terms of age, gender,

marital status, education, and occupation, and the two groups were homogeneous in terms of these variables (Table 2).

Health literacy of caregivers of elderly people with type 2 diabetes mellitus had a statistically significant relationship with demographic variables of age, gender, marital status, education level, and occupation. The level of health literacy in female caregivers who were younger, married, had higher education level, and were employed was higher than in other caregivers.

The results of the paired *t*-test showed that the mean health literacy scores in the control group before and after the intervention were 42.13 ± 4.35 and 42.19 ± 4.38, respectively, which were not significantly different ($P > 0.05$). However, the mean health literacy scores in the intervention group before and 3 months after the intervention were 43.72 ± 4.41 and 53.86 ± 5.76, respectively, which were not significantly different ($P \leq 0.001$).

The result of the independent *t*-test, which was used to compare the two groups before the intervention, showed that the mean health literacy scores in the control and intervention groups before the intervention were not significantly different and the two groups were homogeneous. However, after the intervention, this difference became significant, indicating that health literacy scores had an increasing trend in the intervention group ($P \leq 0.001$) (Table 3).

Discussion

Given the importance of health literacy in caregivers of the elderly and its role in providing better health services and promoting community health, this study was conducted to determine the effects of the tele-nursing educational support program based on the COPE model on the health literacy level of family caregivers of elderly people with type 2 diabetes mellitus in 2024-2025. The results of this study showed that the health literacy score in the intervention group before and after the intervention had a significant difference, but no significant difference was observed in the control group. Therefore, the educational support intervention based

Table 1. Educational Content of Educational-supportive Program Sessions

Session type	Session content
In-person sessions (60 minutes each session)	1. Determining the caregivers' problem regarding care and care challenges in the elderly with diabetes mellitus 2. Prioritizing problems, explaining and reviewing the problem-solving process based on the four main components of the COPE model (creativity, optimism, planning, and specialized information) 3. Applying the problem-solving process based on the COPE model to the problem, brainstorming by the researcher for the caregivers 4. Explaining the identified problem, choosing the appropriate solution using lecture techniques, questions and answers, educational images and educational booklets, choosing a person who can help solve the problem (nurse, doctor, and other people) 5. Developing a plan 6. Consulting to determine the time of the next session
Telephone sessions (30 minutes each session)	1. Reviewing the amount of reading the booklet, which was collected by the researcher based on articles and references and included familiarity with diabetes mellitus, signs and symptoms of the disease, factors controlling and exacerbating the disease, appropriate diet, amount of physical activity, side effects and drug interactions, how to properly and safely care for the elderly, explanation of the Health literacy, factors affecting each of the above-mentioned components, strategies for improving the components, the effects of implementing the developed program and studying the materials on caregivers and how to properly care for the patient, the need to follow up on specialized information from health care providers, and so on. 2. Monitoring the amount of program implementation 3. Determining the problem that was the next priority 4. Encouraging the caregiver to study materials related to the next problem before the next session 5. Consulting to determine the time of the next session
WhatsApp follow-ups	Reviewing and responding to caregivers' questions and problems within one month

Table 2. Comparison of Demographic Variables in the Two Study Groups

Characteristics		Group		Test results*
		Control	Intervention	
		No (%)	No (%)	
Gender	Male	14 (31)	16 (36)	P=%51
	Female	31 (69)	29 (64)	
Marital status	Single	8 (18)	11 (24)	P=%46
	Married	38 (72)	34 (76)	
Educational level	Illiterate	14 (31)	15 (33)	P=%54
	Diploma	11 (24)	9 (20)	
	University	20 (45)	21 (47)	
Employment status	Employed	11 (24)	13 (29)	P=%43
	Freelance job	15 (33)	14 (31)	
	Housewife	19 (43)	18 (40)	

*The results of the Chi-square test

Table 3. Between- and Within-group Comparisons of the Mean Scores of Health Literacy

	Time		
Group	**Pre-test**	**Post-test**	**Test results [b]**
Intervention	43.72 ± 4.41	53.86 ± 5.76	$P<0.001$
Control	42.13 ± 4.35	42.19 ± 4.38	$P=0.579$
P-value*	$P=0.648$	$P<0.001$	

*The results of the independent *t*-test; [b] The results of the paired *t*-test

on the COPE educational model had a positive effect on the health literacy of caregivers of the elderly and led to the improvement of their health literacy.

The findings of the present study are consistent with the results of Ahmadzadeh et al, who investigated the effect of an educational intervention based on Freire's educational model on e-health literacy of health care providers in Bojnourd. The results of their study showed that an educational intervention based on the Freire's educational model was effective in improving the level of e-health literacy of health care providers in the intervention group compared to the control group (10). In a study titled "Investigating the Effect of an E-Learning Course at the Beginning of Service on the Knowledge of Health Care Providers", Dehdari et al found that participating in an e-learning course at the beginning of service provision can increase knowledge of health care providers in various aspects of family health care (17). Wang et al conducted a study on the association of e-health literacy with health promotion behaviors of the elderly and found that e-literacy is significantly related to health promotion behaviors in the elderly (18).

Therefore, according to the results of the present study and other previous studies in the field of health literacy, it can be said that educational interventions and the implementation of different models can lead to the improvement of health literacy in health care providers. It can be stated that the effectiveness of health education programs largely depends on the health literacy of caregivers of patients with chronic diseases. Improving the health of caregivers is possible with models such as the COPE model because the use of this model can improve the effectiveness of care provided to the patient and the caregiver's sense of efficacy in caring for the sick family member.

In the present study, most caregivers of the elderly did not have the desired level of health literacy regarding the care of the elderly with type 2 diabetes mellitus. Javadzade et al concluded in their study that health care providers had poor knowledge about health literacy and did not show satisfactory performance in applying its strategies in communication and education to patients (19).

Moreover, there was a statistically significant relationship between caregivers' health literacy and age. It can be said that the older the caregivers are, the less likely they are to read and analyze the necessary training in elderly care. In addition, caregivers are more susceptible to various acute and chronic diseases with their older age. The results of the present study were consistent with the results of the study by Kordasiabi et al, indicating that more than half of patients with diabetes mellitus had insufficient health literacy (20). In their study, health literacy decreased with increasing age (20). In the present study, a statistically significant relationship was also observed between health literacy and the education level of caregivers. According to the findings of the present study, their level of literacy and education should be considered in educating caregivers. The US National Health and Literacy Task Force has also suggested that health-related materials be written at a fifth-grade level; this level is still difficult for one quarter of the population (16, 20). It is necessary to mention that the more educated the caregivers are, the better they understand health information and training. However, caregivers with lower education levels may have difficulty with medication dosage, insulin administration, diet, and understanding medical instructions. According to the results of the study, female caregivers had better health literacy than male caregivers. However, the results of the study conducted by Khosravi et al were inconsistent with our results. In their study, health literacy level was higher in men than in women (21).

Limitations of the Study

One of the limitations of this study was the psychological conditions of the family caregivers when completing the questionnaires, which may have affected their responses. Additionally, the present study was only conducted on family caregivers of elderly people with type 2 diabetes mellitus in Shahrekord city, which may limit the generalizability of the results. Therefore, in order to generalize the results, it is suggested that this work be carried out on a larger scale in other provinces.

Conclusion

In the present study, the tele-nursing educational support program of the COPE model improved the health literacy level of family caregivers of elderly people with type 2 diabetes mellitus in Iran. Therefore, it is possible to take steps to improve the health literacy of patients by considering the necessary policies and plans in the field of applying the COPE model and following up with their caregivers. It is suggested that educational programs should be developed for patient caregivers in hospitals. This method should be used as a routine care program in the clinical area to reduce referrals to hospitals and the health care system, avoid waste of time, and decrease costs imposed on families.

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Competing Interests

The author declares that there is no conflict of interests.

Data Availability Statement

The data from this manuscript will be made available to others upon reasonable request by the corresponding author.

Ethical Approval

This is a randomized clinical trial including family caregivers of elderly people with type 2 diabetes mellitus. The study was conducted after obtaining ethical approval (IR.IAU.SHK.REC.1403.402) and registration in the Iranian Registry of Clinical Trials (IRCT20181122041720N4). Written consent was obtained from each participant prior to their inclusion in the trial.

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References

1. Nourbakh Kashki E, Jahanshahi M, Jannat Alipour Z, Shamsalinia A, Haji Ahmadi M. The effect of Tai Chi exercise on gait speed and the rate of fall in elderly women. J Multidiscip Care. 2021;10(1):14-21. doi: 10.34172/jmdc.2021.04
2. United Nations, Department of Economic and Social Affairs, Population Division. World Population Ageing 2019: Highlights (ST/ESA/SER.A/430). New York: United Nations; 2019. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf.
3. Zhou L, Tang J, Bai JJ, Ming Y. Wound care in elderly diabetic patients after coronary artery bypass grafting: report of 3 cases. Asian J Surg. 2022;45(2):759-60. doi: 10.1016/j.asjsur.2021.11.050
4. Lu X, Sun J, Bai JJ, Ming Y, Chen LR. Investigation and analysis of lower extremity arterial disease in hospitalized elderly type 2 diabetic patients. Int J Nurs Sci. 2018;5(1):45-9. doi: 10.1016/j.ijnss.2017.10.020
5. Ying DG, Ko SH, Li YC, Chen CX. Association between intensive glycemic control and mortality in elderly diabetic patients in the primary care: a retrospective cohort study. Prim Care Diabetes. 2020;14(5):476-81. doi: 10.1016/j.pcd.2020.02.012
6. Seiler A, Jenewein J. Resilience in cancer patients. Front Psychiatry. 2019;10:208. doi: 10.3389/fpsyt.2019.00208
7. Sanaie N, Nejati S, Zolfaghari M, Alhani F, Kazemnezhad A. The effects of family-based empowerment on family cooperation in following patient treatment regime after coroner arteries bypass surgery. Mod Care J. 2014;11(1):19-27.
8. Rejeh N, Heravi-Karimooi M, Taheri Kharame Z, Montazeri A, Vahedian A. Quality of life in patients with myocardial infarction and related factors: a cross sectional Study. Iran J Nurs Res. 2015;9(4):1-11.
9. Suaya JA, Stason WB, Ades PA, Normand SL, Shepard DS. Cardiac rehabilitation and survival in older coronary patients. J Am Coll Cardiol. 2009;54(1):25-33. doi: 10.1016/j.jacc.2009.01.078
10. Khankolabi M, Ahmadzadeh M, Shahrabadi R, Saadati H, Tavakoli Ghochani H. Investigating the effect of an educational intervention based on Freire's educational model on the eHealth literacy of health care workers in Bojnurd. J North Khorasan Univ Med Sci. 2025;17(1):92-100. doi: 10.32592/nkums.17.1.92
11. Mirzaei A, Ramezankhani A, Taheri Tanjani P, Ghaffari M, Jorvand R, Bazyar M, et al. The effectiveness of health literacy based educational intervention on nutritional outcomes of elderly. Iran J Ageing. 2020;15(3):324-37. doi: 10.32598/sija.15.3.2569.1
12. Stars I. Health literacy as a challenge for health education. SHS Web Conf. 2018;40:02004. doi: 10.1051/shsconf/20184002004
13. Alaei A, Babaei S, Farzi S, Hadian Z. Effectiveness of a supportive-educational program based on COPE model on resilience among family caregivers of patients with heart failure: a randomized clinical trial. J Mazandaran Univ Med Sci. 2023;33(220):43-53.
14. LeLaurin JH, Lamba AH, Eliazar-Macke ND, Schmitzberger MK, Freytes IM, Dang S, et al. Postdischarge intervention for stroke caregivers: protocol for a randomized controlled trial. JMIR Res Protoc. 2020;9(11):e21799. doi: 10.2196/21799
15. Mollaee F, Borhani F, Abbaszadeh A. Correlation of burden of care and spiritual health in family caregivers of cancer patients. Nurs Midwifery J. 2019;17(4):292-9.
16. Tehrani Banihashemi SA, Amirkhani MA, Haghdoost AA, Alavian SM, Asgharifard H, Baradaran H, et al. Health literacy and the influencing factors: a study in five provinces of Iran. Stride Dev Med Educ 2007;4(1):1-9.
17. Shiri M, Mojtahedzadeh R, Eshrati B, Dehdari T. The effect of pre-service e-learning on knowledge of health care providers in terms of family health cares. Payesh. 2023;22(1):39-49. doi: 10.52547/payesh.22.1.39
18. Wang Y, Song Y, Zhu Y, Ji H, Wang A. Association of eHealth literacy with health promotion behaviors of community-dwelling older people: the chain mediating role of self-efficacy and self-care ability. Int J Environ Res Public Health. 2022;19(10):6092. doi: 10.3390/ijerph19106092
19. Javadzade H, Hajivandi A, Ghaedi S, Reisi M. Investigating the knowledge and practice of health care providers on health literacy and applying related strategies in relation to referrals to comprehensive health care centers in Bushehr city, Iran. J Health Syst Res. 2020;16(3):180-6. doi: 10.22122/jhsr.v16i3.3628
20. Chaleshgar-Kordasiabi M, Ramezani A, Bakhshavand A. Relationship between health literacy and self-care behaviors in patients with type 2 diabetes. J Health Syst Res. 2020;15(4):262-71. doi: 10.48305/hsr.2020.15.4.102
21. Khosravi A, Ahmadzadeh K, Arastoopoor S, Tahmasbi R. Health literacy levels of diabetic patients referred to Shiraz health centers and its effective factors. Health Information Management. 2015;12(2):194-205.