



Journal of Fundamentals  
of Mental Health



Mashhad University  
of Medical Sciences



Psychiatry and Behavioral Sciences  
Research Center

### Original Article

## The effect of educating caregivers of the elderly with cognitive disorders using mobile application on the care burden

Fatemeh Sharifan<sup>1</sup>; Fatemeh Farhoudi<sup>2</sup>; Farzad AKBARZADEH<sup>2</sup>; Mohammad Sadeghi Bimorgh<sup>3</sup>; \*Ali Emadzadeh<sup>4</sup>

<sup>1</sup>MS. in medical Education, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

<sup>2</sup>Assistant Professor of Psychiatry, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

<sup>3</sup>Ph.D. in Addiction Studies, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

<sup>4</sup>Assistant Professor, Department of Medical Education, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

### Abstract

**Introduction:** This study aimed to investigate the effect of educating caregivers of the elderly patients with cognitive disorders using a mobile application on the care burden.

**Materials and Methods:** In this study 60 caregivers of elderly patients with cognitive disorders in Ibn-e-Sina Psychiatric Hospital of Mashhad-Iran, were selected through the convenient sampling method. Then they were divided randomly into experimental and control groups. The experimental group received both routine training and training through the mobile application, but the control group received only routine training. The research tool was the Zarit questionnaire. Data analyzed using SPSS software version 16.

**Results:** The results showed that the score of the caregivers' burden after the intervention was significantly different from before the intervention ( $P < 0.001$ ). Also, comparing the mean score of caring stress after the intervention was significantly different according to the group and education, according to the group and gender, as well as according to the group and the caregivers' family relationship ( $P = 0.037$ ,  $P = 0.16$ , and  $P = 0.046$ , respectively). However, there was no significant difference between the mean score of care load pressure after the intervention of group and patients' movement problems ( $P = 0.174$ ).

**Conclusion:** It seems that education through mobile application can play an effective role in reducing the care burden. Also, the care burden varies according to the level of education, gender, and family relationship. Therefore, the use of educational methods through mobile applications is recommended as a low-cost method in health care settings for patients and their families.

**Keywords:** Application, Care burden, Cognitive disorders

### Please cite this paper as:

Sharifan F, Farhoudi F, Akbarzadeh F, Sadeghi Bimorgh M, Emadzadeh A. The effect of educating caregivers of the elderly with cognitive disorders using mobile application on the care burden. *Journal of Fundamentals of Mental Health* 2021 Nov-Dec; 23(6): 375-381.

### Introduction

Cognitive disorders such as Alzheimer's are associated with gradual onset and continuous progression. Over time, memory and other

mental abilities such as thinking, reasoning, and judgment are affected, and the person has difficulty performing daily life tasks (1,2). These patients need the care to survive (3). According

### \*Corresponding Author:

Department of Medical Education, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran  
emadzadea@mums.ac.ir

Received: Mar. 02, 2021

Accepted: Aug. 10, 2021

to the Welfare Organization, 91% of the elderly live with their spouses and children, and 23% are cared for by their children (4). Care burden is one of the problems in caring for the elderly with Alzheimer's disease (5,6). Caring for the elderly has much stress so that the caregiver suffers from social isolation and reduces the tolerance of care burden in him. Caregivers are less able to participate in social activities, leading to psychological problems for caregivers (7). Liu et al. conducted a study on the caregiver burden of Alzheimer's patients and reported that depression, anxiety, and sleep problems are the most important challenges faced by family caregivers of Alzheimer's patients. They also stated that the burden of care is strongly related to patients' dementia. The burden of care affects the functional status of caregivers, life satisfaction, and the extent of their depression and anxiety (8). Interventions effective in reducing the suffering of care can be effective in maintaining and improving the physical and mental performance of caregivers (9). To reduce the burden of care for home caregivers, researchers have conducted various studies on caregivers of Alzheimer's patients, which include psychological training programs (10,11). In order to reduce the burden of care for home caregivers, researchers have conducted various studies on caregivers of Alzheimer's patients, which also include psychological training programs (12). Mobile phones are one of the most widely used e-learning tools for transferring educational topics (13,14). Approximately 20% of smart phone users have one or more health-related applications on their mobile phones and use them as a strategy to overcome some traditional methods such as face-to-face health interventions (15). These applications provide the possibility of providing health care outside the clinical environment and continuous support and self-management (16-18). It is estimated that these applications are installed on more than 500 million smart phones worldwide. According to the World Health Organization, 83% of the 112 member countries have provided at least one health app for users in their home country. In 2017, there were more than 325,000 mobile health apps (19).

There was no research on the effect of education by mobile applications on caregivers of the elderly with Alzheimer's disease in previous research. This study aimed to investigate the effect of training on caregivers of the elderly with Alzheimer's disease using a

mobile application to reduce the burden of caring for Alzheimer's patients referred to Ibn-e-Sina Hospital in Mashhad from November 2019 to March 2020.

### Materials and Methods

The research was an experimental study of two groups before and after the intervention. This study was an experimental study of two groups before and after. This study was performed among caregivers of patients with cognitive disorders referred to Ibn-e-Sina Psychiatric Hospital in Mashhad from December 2017 to April 2016, done with the code of ethics number IR.MUMS. MEDICAL. REC.1399.004 in Mashhad University of Medical Sciences. The ethical considerations of this study were the confidentiality of patients' information and participants' responses and obtaining informed consent to participate in the study. The statistical population of the study was 78 caregivers of patients with cognitive disorders who were alive and had a record of hospitalization in Ibn-e-Sina Psychiatric Hospital in Mashhad. The sample size was determined based on Cochran's formula of 65 people (20). After meeting the inclusion criteria and performing informed consent, 60 Alzheimer's patients' caregivers were selected through available sampling and randomly divided into experimental and control groups.

Inclusion criteria include fulfilling informed consent form, literacy, caring for a patient who is only Caring for a patient with a cognitive disorder, having a smart phone by the caregiver. Exclusion criteria included unwillingness to continue research, death of their Alzheimer's patient, and failure to use the application during the study. In addition to receiving routine training, which included face-to-face training and the use of pamphlets, the experimental group also received training as an intervention through the mobile application, but the control group received only routine training during the study. Finally, due to the ethical principles of the research, at the end of the research, the mobile educational application was provided to the control group. The mobile educational application used in the research is for caregivers of patients with cognitive disorders such as Alzheimer's patients. Caregivers obtain the necessary information to care for elderly patients with cognitive disorders categorized and based on a list. This application can be installed on a mobile phone, and its contents are taught in simple language.

### Research instrument

A) *Zarit Care Pressure Questionnaire*: This questionnaire was developed in 1998 by Zarit et al. and contained 22 questions. In this tool, the burden of caring in caregivers is divided into two groups, objective and subjective, based on the questions. Objective pressure refers to the adverse effects of the disease on the caregiver. Mental stress is the emotional reactions of caregivers to patients and their care. Based on Zarit Caregiver Burden Questionnaire, three questions (2,3, and 15) examine the objective burden, three questions (7,8, and 14) the mental care pressure, and question number 22 examine the mental and objective burden. Each question is scored on a 5 point Likert scale ranging from - never to nearly always present. Scores of 0 to 20 (low burden), scores 21 to 40 (moderate burden), and scores 41 to 88 (severe burden). The reliability coefficient of the

original version by retest method was 0.71, and internal consistency with Cronbach's alpha was 0.91. The reliability of this questionnaire using the retest method by Navidian et al. was 0.94 (21,22).

### Results

In this study, first, the two experimental and control groups were examined in terms of contextual variables and the frequency and homogeneity of the groups. The results showed that the two groups were homogeneous in terms of gender, age, marital status of caregivers, duration of patient care, age, sex, and alertness of the elderly ( $P > 0.05$ ), but the two groups were not homogeneous in terms of education and the degree of kinship of caregivers with the elderly, as well as mobility problems, place of care and duration of cognitive disorders in the elderly ( $P < 0.05$ ) (Table 1).

**Table 1.** Frequency distribution of demographic characteristics of elderly caregivers in the two groups of intervention and control

Variables	Control group		Intervention group		P	
	Frequency	Percentage	Frequency	Percentage		
Gender	Male	14	46.7	14	46.7	1.000
	Female	16	53.3	16	53.3	**
Age (Year)	15-35	13	43.3	13	43.3	0.692
	36-55	15	50.0	17	56.6	*
	56 to up	2	6.7	0	0	
Educational level	Less of diploma	0	0	4	13.3	
	Diploma	5	16.7	11	36.7	
	Associate degree	0	0	7	23.3	<0.001
	Bachelor	17	56.7	8	26.7	*
Marital status	Masters and Ph.D	8	26.7	0	0	
	Single	5	16.7	11	36.7	
	Married	25	83.3	18	60.0	0.111
Caregivers kinship	Divorced	0	0	1	3.3	**
	Children	6	20.0	8	26.7	
	Spouse	0	0	2	6.7	0.003
Care period	Close relatives	4	13.3	13	43.3	**
	Buy service	7	23.3	20	66.7	
	Every day	15	50.0	14	46.7	0.796
Age of the patient (Year)	Several days a week	15	50.0	16	53.3	**
	Less than 70	13	43.3	14	46.6	
	71-80	17	56.7	9	30.0	0.539
Patients movement problem	81 to up	7	23.3	0	0	*
	Physical	7	23.3	8	26.7	
	Motor	4	13.3	6	20.0	0.026
Patients care place	Physical and motor	19	63.3	10	33.3	**
	No disease	0	0	6	20.0	
	Home	9	30.0	23	76.7	<0.001
Patients consciousness	Care centers	21	70.0	7	23.3	**
	Conscious	21	70.0	19	63.3	
	Semi-conscious	9	30.0	10	33.3	0.789
Duration of cognitive disorder (Year)	Unstable consciousness	0	0	1	3.3	**
	Less than 5 years	15	50.0	9	30.0	
	5-10	15	50.0	15	50.0	0.028
	11 to up	0	0	6	20.0	**

The results also showed that the score of care pressure after the intervention compared to before the intervention in the intervention group was  $15.3 \pm 8.1$  and in the control group was  $6.8 \pm 2.5$ , and according to the Mann-Whitney test, this difference was significant ( $P < 0.001$ ). Depending on the group and education and according to the group and gender, the mean score of burden care was significantly different after the intervention than before ( $P = 0.037$ ), ( $P = 0.016$ ). Depending

on the group and the patient's movement problem, the two-way analysis of variance test did not show a significant difference in the mean score of care burden after the intervention ( $P = 0.174$ ). However, based on the relationship kinship of caregivers with the elderly, the results showed that the mean score of caregiver burden after the intervention was significantly different according to the group and the caregiver relationship with the elderly ( $P = 0.046$ ) (Table 2).

**Table 2.** The effect of educating caregivers of the elderly with cognitive disorders based on research objectives

variables	control group		Intervention group		F	df	P*
	Standard deviation $\pm$ mean		Standard deviation $\pm$ mean				
Educational level	Less of diploma	4.9 $\pm$ 47.3	-	-	2.4	6	0.037
	Diploma	13.6 $\pm$ 48.1	10.4 $\pm$ 37.8	-			
	Associate degree	9.4 $\pm$ 45.3	-	-			
	Bachelor	7.1 $\pm$ 50.1	8.3 $\pm$ 37.5	-			
Gender	Masters and Ph.D	0.0 $\pm$ 0.0	12.7 $\pm$ 46.6	-	3.8	3	0.016
	Male	6.3 $\pm$ 48.3	10.9 $\pm$ 37.0	-			
	Female	12.6 $\pm$ 47.5	9.5 $\pm$ 42.6	-			
Patients movement problem	Physical	7.2 $\pm$ 45.0	13.3 $\pm$ 39.1	-	1.6	6	0.174
	Motor	9.3 $\pm$ 48.2	14.6 $\pm$ 38.5	-			
	Physical and motor	13.9 $\pm$ 48.9	8.9 $\pm$ 40.6	-			
	No disease	7.4 $\pm$ 49.7	-	-			
Caregivers kinship	Children	13.3 $\pm$ 51.4	10.8 $\pm$ 48.8	-	8	2.2	0.046
	Spouse	16.3 $\pm$ 50.5	0.0 $\pm$ 0.0	-			
	Grandchildren	9.6 $\pm$ 46.3	10.1 $\pm$ 33.3	-			
	Close relatives	6.3 $\pm$ 46.0	0.0 $\pm$ 41.0	-			
	Buy service	9.3 $\pm$ 46.3	9.4 $\pm$ 38.3	-			

\* Bilateral variance

## Discussion

In this study, training caregivers of the elderly with cognitive disorders using a mobile application on the burden care resulting from their patient care in the city of Mashhad was investigated. The results showed that the score of post-intervention caregivers' burden had a significant decrease compared to before the intervention in the experimental group. However, in the studies conducted, no similar study was observed regarding the effect of education through mobile applications on reducing the burden of care in caregivers of patients with cognitive disorders. However, Bagherbeik Tabrizi et al. studied the effect of teaching behavioral-cognitive interventions on reducing the care burden of family caregivers of the elderly with Alzheimer's disease. In this study, the care burden of 70 family caregivers of the elderly with Alzheimer's disease (35 subjects in the control group and 35 subjects in the experimental group) was measured using the ZARIT pre-intervention and post-intervention

care questionnaire (6 weeks later), and the results of the intervention were significant (23). The results of the present study were consistent with the results of this study.

In another study, Ebrahimi et al. investigated the effect of educational intervention using mobile phones on women's lifestyle referring to Bandar Abbas health centers. The sample size in this study was 90 people, divided into two groups of 45 people. The intervention was designed by the educational program using WhatsApp software for three months, and the samples were examined with the Health-promoting lifestyle profile II questionnaire. The authors report significant results in the intervention group's scores compared to the control group in the areas of individual responsibility for health, physical activity, nutritional behaviors, mental and spiritual development, interpersonal relationships, and stress control, which indicates a reduction in the burden of care (24). These results were also consistent with our study. Also, the results of the

present study with the research results Qaraati et al. investigated the effect of educational intervention via mobile phone on self-care behaviors of patients with thalassemia major and expressed a significant increase in the mean scores of knowledge, attitude, and self-care behaviors of the intervention group are consistent (25). In another study by Philadelphia, Ragonatan et al. surveyed 631 participants about their interest in using cell phones and mobile apps in cancer patients. They reported that out of 631 participants, 466 (74%) expressed regular interest in supportive care information through the use of mobile devices and 242 (39%) through mobile applications (26). Although in our study, the participants' interest in using the mobile application was not one of the objectives of the research, the non-withdrawal of participants from the study and their welcome to install a mobile educational application and support until the end of the study was a sign of their interest in this regard. According to the group and education, there was a significant difference in the mean score of caregiver burden after the intervention. Education is one of the important characteristics that are effective in different aspects of life to face problems better and make a person better able to solve the problems ahead. In addition to better mastery of mobile educational software, a person with higher education understands and applies training more effectively (27), and the results of this study better illustrate these concepts. Also, in the results, the mean score of burden care after the intervention was significantly different according to the group and gender. From a medical and non-medical point of view, differences have been expressed between women and men. In addition to the essential human commonalities between men and women, the two are inherently and evolutionarily different from each other (28).

Psychological differences between men and women have also been proven from a psychological point of view, but another important issue in caring for elderly patients is physical strength, which is very important. In general, the physical strength of the male is higher than the female physiologically. If the body is subject to pressure from movement, transfer, or the elderly, this pressure can also affect the caregiver's psyche, and consequently, the caregiver's burden will be more significant (29). The results of this study also indicated a difference in the burden of caring for gender.

Finally, the results showed that the mean score of burden care after the intervention differed according to the group and the ratio of caregivers to the elderly. Some families use service providers to care for their elderly patients. Human emotions and a sense of responsibility towards the elderly in the family are human nature. The closer the patient's relationship is to the caregiver, the greater the sense of caring responsibility. One of the limitations of this study was the lack of similar internal and external research to investigate the effect of education in reducing the burden of care in caregivers of patients with cognitive impairment, which made it difficult to compare the results. The following limitation was the inability to assess families' financial situation because families with better economic status have more opportunities to care for their elderly. Therefore, economic status was an important factor in increasing or decreasing the burden of caring for their patients, which may affect the results of the study. Another limitation was the justification of families who were very reluctant to cooperate and participate in the study, cooperated with many explanations and ensured the confidentiality of research questions and ethics.

### **Conclusion**

Mobile app training can effectively reduce the burden of caring for caregivers of patients with cognitive disorders such as Alzheimer's. Also, the amount of burden care in caregivers varies based on the level of education and gender and their family relationship with the patient under care. Therefore, mobile educational methods, a low-cost and accessible method in medical settings for patients and their families, are recommended.

### **Acknowledgments**

This study was the subject of a master's thesis in medical education at Mashhad University of Medical Sciences, registered with the ethics code IR.MUMS.MEDICAL.REC.1399.004 with the financial support of the Vice-Chancellor for Research and with the research number 981112, and was approved by the ethics committee of Mashhad University of Medical Sciences. The authors state that there is no conflict of interest in this study. In the end, the efforts and guidance of the respected supervisors, consultants, and all participants in this research are appreciated and thanked.

## References

1. Villars H, Cantet C, de Peretti E, Perrin A, Soto-Martin M, Gardette V. Impact of an educational programme on Alzheimer's disease patients' quality of life: results of the randomized controlled trial. *Alzheimers Res Ther* 2021; 13(1):152.
2. Guillon J, Attal Y, Colliot O, La Corte V, Dubois B, Schwartz D, et al. Loss of brain inter-frequency hubs in Alzheimer's disease. *Sci Rep* 2017; 7(1): 10879.
3. Grabher BJ. Effects of Alzheimer disease on patients and their family. *J Nucl Med Technol* 2018; 46(4): 335-40.
4. Jafarizadeh H, Maddah S, Norozi K, Rahgozar M. Assessment of health care needs of frail elderlies in 13th district of Tehran and their caregivers problems in 2005. *Nursing and midwifery journal* 2006; 4(2): 67-81.
5. Garcia-Ribas G, García-Arcelay E, Montoya A, Maurino J. Assessing knowledge and perceptions of Alzheimer's disease among employees of a pharmaceutical company in Spain: A comparison between caregivers and non-caregivers. *Patient Prefer Adherence* 2020; 14: 2357-64.
6. Hua AY, Wells JL, Brown CL, Levenson RW. Emotional and cognitive empathy in caregivers of persons with neurodegenerative disease: Relationships with caregiver mental health. *Clin Psychol Sci* 2021; 9(3): 449-66.
7. Acosta D, Rottbeck R, Rodríguez G, Ferri CP, Prince MJ. The epidemiology of dependency among urban-dwelling older people in the Dominican Republic; a cross-sectional survey. *BMC Public Health* 2008; 8(1): 285.
8. Nguyen M, Pachana NA, Beattie E, Fielding E, Ramis MA. Effectiveness of interventions to improve family-staff relationships in the care of people with dementia in residential aged care: a systematic review protocol. *JBI Database System Rev Implement Rep* 2015; 13(11): 52-63.
9. King A, Ringel JB, Safford MM, Riffin C, Adelman R, Roth DL, et al. Association between caregiver strain and self-care among caregivers with diabetes. *JAMA* 2021; 4(2): e2036676.
10. Paúl C, Teixeira L, Duarte N, Pires CL, Ribeiro O. Effects of a community intervention program for dementia on mental health: the importance of secondary caregivers in promoting positive aspects and reducing strain. *Commun Ment Health J* 2019; 55(2): 296-303.
11. Rosell-Murphy M, Bonet-Simó JM, Baena E, Prieto G, Bellerino E, Solé F, et al. Intervention to improve social and family support for caregivers of dependent patients: ICIAS study protocol. *BMC Fam Pract* 2014; 15: 53.
12. Shim YS, Park KH, Chen C, Dominguez JC, Kang K, Kim HJ, et al. Caregiving, care burden and awareness of caregivers and patients with dementia in Asian locations: a secondary analysis. *BMC Geriatr* 2021; 21(1): 230.
13. Naslund JA, Shidhaye R, Patel V. Digital technology for building capacity of nonspecialist health workers for task sharing and scaling up mental health care globally. *Harvard Rev Psychiatry* 2019; 27(3): 181-92.
14. Tabi K, Randhawa AS. Mobile Apps for medication management: Review and analysis. *JMIR Mhealth Uhealth* 2019; 7(9): e13608.
15. Tripp N, Hainey K, Liu A, Poulton A, Peek M, Kim J, et al. An emerging model of maternity care: smartphone, midwife, doctor? *Women and birth. J Aust Coll of Midwives* 2014; 27(1): 64-7.
16. Chomutare T, Fernandez-Luque L, Arsand E, Hartvigsen G. Features of mobile diabetes applications: review of the literature and analysis of current applications compared against evidence-based guidelines. *J Med Internet Res* 2011; 13(3): e65.
17. Goyal S, Cafazzo JA. Mobile phone health apps for diabetes management: current evidence and future developments. *QJM* 2013; 106(12): 1067-9.
18. Martínez-Pérez B, de la Torre-Díez I, López-Coronado M. Mobile health applications for the most prevalent conditions by the World Health Organization: review and analysis. *J Med Internet Res* 2013; 15(6): e120.
19. Larson RS. A Path to better-quality mHealth Apps. *JMIR mHealth and uHealth* 2018; 6(7): e10414.
20. Xu X, Zhu H. Sample size considerations for stratified cluster randomization design with binary outcomes and varying cluster size. *Stat Med* 2019; 38(18): 3395-404.
21. Bianchi M, Flesch LD, Alves EV, Batistoni SS, Neri AL. Zarit burden interview psychometric indicators applied in older people caregivers of other elderly. *Rev Lat Am Enfermagem* 2016; 24: e2835.
22. Navidian A, Pahlevanzadeh S, Mohsen Y. [The effectiveness of family training on family caregivers of inpatients with mental disorders]. *Iranian journal of psychiatry and clinical psychology* 2010; 16: 99-106. (Persian)
23. Bagherbeik Tabrizi L, Navab E, Farokhnezhad Afshar P, Asadi Noghabi AA, Haghani H. [Effect of cognitive-behavioral intervention on burden of family caregivers of patients with Alzheimer's disease]. *Hayat* 2015; 21(1): 94-102. (Persian)
24. Ebrahimi F, Aghamolaei T, Abedini S, Rafati S. [Effect of educational intervention using mobile on life style of women who referred to health centers in Bandar Abbas]. *Iranian journal of health education and health promotion* 2017; 5(2): 81-9. (Persian)
25. Gharaati F, Aghamolaei T, Hosseini Z, Davoodi SH, Hassani L, Mohamadi R, et al. Effect of a mobile-phone mediated based education on self-care behaviors of patients with thalassemia major. *J Caring Sci* 2019; 8(3): 149-55.

26. Raghunathan NJ, Korenstein D, Li QS, Tonorezos ES, Mao JJ. Determinants of mobile technology use and smartphone application interest in cancer patients. *Cancer Med* 2018; 7(11): 5812-9.
27. Gisbert M, Bullen M. Teaching and learning in digital world. *Strategies and issues in higher education*. Publications URV; 2015.
28. Mohammadi M. [A contrastive analysis of gender difference in experimental sciences and religious meanings]. *A research biannual religious anthropology* 2013; 10: 71-81. (Persian)
29. Abdollahpour I, Nedjat S, Noroozian M, Salimi Y, Majdzadeh R. [Caregiver burden: the strongest predictor of self-rated health in caregivers of patients with dementia]. *Journal of geriatric psychiatry and neurology* 2014; 27(3): 172-80. (Persian)