

Original Article



Self-Care Practices and Related Factors in Patients with Multiple Sclerosis (MS) Based on the Health Belief Model

Hajar Habibi¹, Behnaz Sedighi², Yunes Jahani³, Marziyeh Hasani⁴, Abedin Iranpour^{5*}¹Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.²Neuroscience Research Center, Kerman University of Medical Sciences, Kerman, Iran.³Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.⁴Department of Health Education and Promotion, School of Health, Kerman University of Medical Sciences, Kerman, Iran.⁵HIV/STI Surveillance Research Center, WHO Collaborating Center for HIV Surveillance, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.**Article Info****Article History:**

Received: 14 Apr 2019

Accepted: 26 Jan 2020

e-Published: 24 May 2021

Keywords:

Multiple sclerosis, Health belief model, Self-care

Corresponding Author:

Iranpour Abedin, Email:

a.iranpour@kmu.ac.ir

Abstract**Introduction:** Self-care programs can raise health in patients with Multiple Sclerosis (MS). This study aimed to identify the self-care behaviors and determinants in patients with MS according to the Health Belief Model (HBM).**Methods:** In this cross-sectional study, we included 280 MS patients through convenience sampling method. The collection tool was a self-administered questionnaire based on HBM. The participants were the members of MS society in Kerman, Iran. The data were analyzed using descriptive statistics, path analysis, and multivariable linear regression in SPSS software Version 22.**Results:** The mean (SD) score for self-care practices was 2.86 (0.64), and medication adherence was the most conducted practice. The perceived benefits and cues to action exerted positive influence on self-care practices. The most frequent symptoms experienced by the participants were fatigue (82.5%), visual impairment (76.4%), headaches (72.1%), and muscle weakness (71.4%). The most important cues to action for self-care behavior were the physician (77%), media (52%), and other MS patients (32%).**Conclusion:** The quality of life (QOL) of MS patients is heavily influenced by self-care behaviors. In this study, only about half of the patients accomplished self-care behaviors, which seems to be insufficient. Since the perceived benefits and cues to action are the main predictors of self-care practices, intervention based on these two constructs can be utilized to promote self-care programs and QOL in MS patients. Health-care providers should pay more attention to these factors for promoting self-care behaviors.**Introduction**

Multiple Sclerosis (MS) is an autoimmune disease that causes destruction to Myelin Membranes cells in the nervous system. After road accidents, the disease is the second cause of disability in young people. The prevalence of the disease is estimated to be 2.5 million people in the world.¹⁻³ In Iran, the prevalence of the disease is about 29.3 per 100,000. The prevalence of MS in women and men was estimated to be 44.8 per 100,000 and 16.5 per 100,000 respectively ($P < 0.001$), while Iran has the highest prevalence of the disease in the Middle East.⁴

The prevalence of the disease in Kerman province is 31.5 cases in 100,000² and in the city of Kerman, it is 57 cases in 100,000.⁵ What is noteworthy regarding MS in Iran is its prevalence growth in recent years.⁶ In particular,

the motto of world health organization in 2014 was a healthy life with self-care, which shows that self-care is of the highest priority in the medical and health services system.⁷

People with this disease require compatibility and adjustment with its chronic challenges.⁸ One way patients with Multiple Sclerosis can correctly become compatible with its complications is self-care practices. In order for people to conduct self-care practices, they must be encouraged to accept responsibility for their health.⁹ Self-care means any action a person does independently and without assistance to protect their health.¹⁰ The important goals of self-care include monitoring the disease, enhancing self-functioning, and decreasing complications.⁸

Self-care causes promotion in life quality of patients

with MS, and with constant following up, its acute and chronic complications can be avoided or delayed.^{11,12}

Educational planning for interventions should be tailored to the needs of the patients based on various social groups, therefore it seems necessary to examine the determinants of the health problem.¹³ Nowadays, the use of health education theories and models to determine different effective factors on health practices and promotion of self-care practices in patients with chronic diseases is increasing. The Health Belief Model (HBM) is one of the models that is used as a conceptual model to perceive and predict adherence to self-care practices.¹⁴ The HBM is based on the assumption that the health practices such as self-care practices are rooted in people's health beliefs and leads the person into healthy behaviors.¹⁵

The main constructs of the model including, a- Perceived susceptibility: the belief that a person is exposed to the dangers of the disease complications, b- Perceived seriousness: the belief that the effects of the MS disease are a serious problem that can lead to serious consequences, c- Perceived benefits: the belief in the benefits of the proposed procedures to reduce the risk or severity of the disease complications, d- Perceived barriers: psychological, financial or physical, and etc. barriers that interfere with self-care practices in the people, e- Cues to action: it contains health messages by the media and reliable people, such as doctors, trusted political and religious leaders who influence the practices of the target group, f- Self-efficacy is also defined as a person's confidence in their ability to pursue a practice.^{16,17}

Multiple Sclerosis, from the viewpoint of research, is research-difficult because the disease is unknown, and without a specific pattern for the disease.¹⁸ Given the importance of the abovementioned points and with reference to the increasing incidence of the disease in Iran, self-care can provide rehabilitation for patients and prevent further disabilities. In studies about MS in Iran especially Kerman self-care and the importance of membership in the MS society have not been addressed. Since the quality of life of MS patients is heavily influenced by self-care and limited studies on self-care related factors in this area. Therefore, identifying the related factors of self-care, can help these patients for seeking and performing self-care.

The aim of this study was to determine the factors affecting self-care practices based on the HBM model; so that with better recognition of self-care determinants, more accurate planning of these practices is implemented to increase these practices in patients.

Materials and Methods

This cross-sectional study is descriptive-analytical based on the HBM, being conducted on 280 patients suffering from MS selected by convenience sampling method from the members of the MS Society in Kerman from October to December 2017 that confirmed diagnosis of the MS disease. Based on one similar study in Iran¹⁹ at the

95% confidence level and considering $r=0.2$, the sample size 260 people were estimated. Due to the possible lack of cooperation, 5% were added to this sample size. As a result, 280 people with different conditions were included in the study. Verbal informed consent and being the member of the Kerman MS society were the inclusion criteria. The data collection instrument of this research consisted of a questionnaire with 71 items. The tool consisted of three parts: The first part was about the background information including age, sex, education, marital status, occupation, residency and years of illness with 7 items. The second part was related to the constructs of the HBM and the type of self-care practices with a total of 64 questions. Perceived susceptibility, perceived severity, and perceived benefits had 7, 6 and 6 questions respectively. The scoring method of the three constructs ranged from strongly disagree to completely agree with the five-point Likert Scale (from 1 to 5). Perceived barriers had 12 questions with a 3-point Likert scale (None, Low, High). The cues to action had 11 yes-no items and self-care practices had 22 questions with a 5-point scale as never, rarely, sometimes, often, and always (scoring from 1 to 5). The score of all constructs were finally converted to a 1 to 5 scale. Because there were many questions regarding self-care practices in the questionnaire, and since self-efficacy was to be written separately for each practice, the self-efficacy construct of the model, in this study, was not investigated. The third part including 19 items about experience of the symptoms of MS with yes and no scale.

The validation of the Self-care MS questionnaire was obtained in another study.¹⁹ The internal consistency of the questionnaire was determined by Cronbach's alpha coefficient in a pilot study with 27 patients and all the constructs values were above 0.62 (range: 0.71-0.97).

The purpose of study was explained to the participants, and all then completed the self-report questionnaires. Data were collected using the sealed ballot box method. Inquiring place was MS society office and private doctor's offices that who were members of MS society in Kerman. The response time was about 30 minutes (range: 25 – 35 minutes) and the response rate was about 90%. Ethical permission was obtained from the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1395.298) before the study began. In analyzing the data, descriptive indicators such as frequency, mean and standard deviation were used. The significance level was set at 0.05 and for data analysis, SPSS Ver .22) SPSS Inc., Chicago, IL, USA) was used. To determine the relationship between demographic variables and model constructs, the univariate and multivariate linear regression models were used. Initially, the significant variables at 0.2 were entered in the univariate regression and then they were entered into multivariate regression. The elimination method was used to finalize the model and the final multivariate regression model solely included significant variables at 0.05. The relationship between independent variables and

self-care practices were ultimately determined.

Results

The participants were between 16 and 59 years of age, the average being 33.09 (7.91). Female patients participating in the study were four times more than male patients. Half of the participants (49.6%) had higher education. Fifty eight percent of them were married and 37% of the participants were housewives. More than 91% of the patients lived in the city and the rest in rural areas and 57.5% of the patients had been diagnosed with MS less than 5 years before (Table 1).

According to the findings of the study, the most commonly experienced symptoms by the participants during illness were fatigue (82.5%), visual impairment (76.4%), headaches (72.1%) and muscle weakness (71.4%). Also, the most important cues to action for self-care behavior were the physicians (77%), the media (52%) and other MS patients (32%), respectively in order of importance. In the questionnaire used in this study, 22 self-care practices were examined and the largest average obtained was related to drug compliance 4.28 (1.26). The 68.21% of the people under the study took drugs regularly. Also 78.71% of the participants did not use light weights and the least average obtained was related to the use of light weights to tackle motion inconsistencies and

Table 1. Distribution of demographic variables in MS patients in Kerman

Variable	N (%)
Age (years)	
<20	14(5.0)
20-40	219(78.2)
>40	47(16.8)
Age[€]	33.09(7.91)
Gender	
Male	53(18.9)
Female	227(81.1)
Level of education	
Primary / Middle education	36(12.9)
High school	105(37.5)
Collegiate	139(49.6)
Marital status	
Single	96(34.3)
Married	163(58.2)
Divorced or widow	21(7.5)
Occupation	
Employee	93(33.3)
Housewife	104(37.1)
Student	43(15.4)
Retired	3(1.1)
Unemployed	37(13.1)
Residency	
City	255(91.1)
Village	25(8.9)
Years of illness	
<5	161(57.5)
5-10	56(20)
>10	63(22.5)

[€]Mean (SD)

trembling hands and feet with the score of 1.26 (1.66).

Based on the result of this study, the participants had a relatively high perceived benefits towards MS disease, so that the highest and lowest scores of the constructs of the HBM were the perceived benefits and perceived barriers, respectively (Table 2).

It was found that sex and education variables were significantly associated with the constructs of the model. Sex had association with the perceived benefits, cues to action and self-care behaviors, and the education variable was associated with perceived barriers, cues to action, and self-care behaviors. Men's self-care behaviors were 0.77 higher than women's, and the ones with education lower than high school displayed self-care behaviors 0.72 less than those with collegiate education ($P < 0.05$). There was a significant relationship between the self-care practices and cues to action and the perceived benefits of the construct (Table 3).

Using the path analysis in relation between the HBM constructs and self-care practices in participants showed

Table 2. Descriptive indices in the constructs of HBM in MS patients in Kerman (from 5 score)

Constructs of the HBM	Mean(SD)	Median (IQR [€])
Perceived susceptibility	4.18(0.61)	4.14(3.86)
Perceived severity	4.23(0.72)	4.33(2.83)
Perceived benefits	4.39(0.57)	4.50(2.33)
Perceived barriers	2.56(1.20)	2.59(5)
Cues to action	3.94(0.50)	4.09(2.05)
Self-care behavior	2.86(0.64)	3.13(3.86)

[€]Interquartile range

Table 3. Association between demographic variables with the constructs of HBM

Constructs of the HBM	Variable	B(CI) [€]	P
Perceived benefits	Gender		
	Male	0.23(0.40, 0.06)	0.007*
Female	Ref [€]		
Perceived barriers	Education		
	Primary/middle education	0.22(0.05,0.40)	0.01*
	High school	0.08(-0.03,0.21)	0.15
Collegiate	Ref		
Cues to action	Gender		
	Male	0.17(0.02,0.31)	0.02*
Female	Ref		
Self-care behavior	Education		
	Primary/middle education	0.36(0.18,0.54)	0.00*
	High school	0.21(0.09,0.33)	0<00*
	Collegiate	Ref	
Self-care behavior	Gender		
	Male	- 0.23(-0.43,-0.04)	0.01*
	Female	Ref	
	Education		
Primary/middle education	-0.28(-0.52,-0.04)	0.01*	
High school	-0.11(-0.27,0.05)	0.17	
Collegiate	Ref		

that the cues to action had the most positive effect ($P < 0.001$) (Table 4).

Out of 0.57 correlations between cues to action and self-care practice, 0.17 was direct effect and the rest (0.40) was indirect effect due to the perceived benefits. As figure 1 demonstrates, if one point is added to cues to action, the perceived benefits will, on average, increase by 0.40.

If the perceived benefits increase by one point, self-care practices will, on average, increase by 0.31. If the cues to action increases by one point, self-care practices will, on average, increase by 0.57 (Figure 1).

Discussion

In view of the fact that self-care is one of the most important factors to empower the patients with Multiple Sclerosis,¹² this study was conducted aiming to determine the factors affecting the self-care practices of patients with MS based on the HBM. The results revealed that women were four times more than men, which is consistent with the overall prevalence of MS in both sexes.²⁰ Seventy eight percent of the patients were between 20 and 40 years of age, which is consistent with the findings of similar studies providing almost adequate ground for possible generalization of the results.²¹ More than 50% of the patients had higher education, which is consistent with Abedini et al., study.²² Many studies revealed that education has, in general, more effect on health than income or career. A possible justification for such findings might be the rather strong association between illiteracy and feelings of irresponsibility to health-care while the educated can better perceive and adhere to health-care.²³

The most commonly experienced symptoms by the participants during illness were visual impairment, headaches, muscle weaknesses and fatigue, which is in line with the results of Crabtree-Hartman study.²⁴

Due to the perceived susceptibility, patients were aware of the fact that if they did not take care of themselves, they would be at the risk of disability. In a similar study,²⁵ the perceived susceptibility was mediocre but, in our study, the mean score of the participants in this construct was relatively high. This difference may be due to the membership of the MS society. Because group discussions which take place in these societies are the most important way to change people's attitudes, which can lead to a change in the patient's perspective and thus increase self-care.

In the case of the perceived seriousness, most of the patients believed that the disease relapse could cause

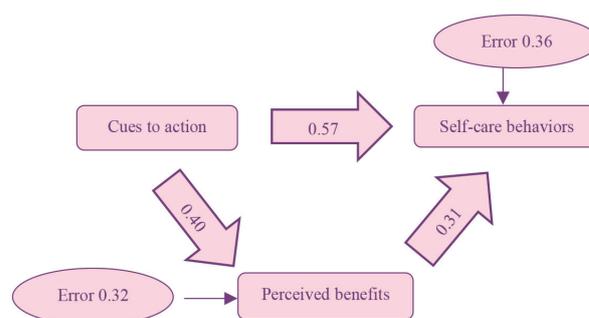


Figure 1. The relationship between the HBM and self-care behaviors

high financial costs for them. As a result, due to the high susceptibility and seriously constructs in patients, the perceived threat also rises, as a result and the patients will do more self-care. This finding is consistent with the assumption of HBM.²⁶

In the current study, the perceived susceptibility and seriousness of the patients were observed to be average, which indicated that patients were sensitive to their health and found themselves exposed to danger. However, excessive increase of the perceived threat may, due to fear, impede patients' effective measures in a way that we can say a balanced level of anxiety and fear can increase the practice while excessive fear can decrease functioning.

The perceived benefits construct to do self-care practices gained the highest score. This indicates that patients with this disease have realized the benefits of self-care practices. This finding is consistent with recent research.^{16,27,28}

Since most of the patients considered advising physicians, family and other patients support as an accelerating force on self-care behaviors, joining societies would make it more effective to communicate with health care providers. On the other hand, the more educational publications are available to these patients, the higher the self-care behaviors will be. According to obtained results about the average self-care practices, 52% of the patients adhere to self-care practices and other studies also show average adherence to self-care practices.^{25,27}

The practice performed most by the patients was compliance with taking medication that was consistent with similar studies,^{19,23} but many studies showed that the side effects of drugs can cause dissatisfaction with the current treatment and discontinuation of medication adherence.²⁹ This difference could be related to the participation of patients in our study in MS society. Because self-care practices in patients with Multiple Sclerosis is an essential, special and lifelong requirement,

Table 4. Path analysis of the relationship between the HBM and self-care practices in patients with MS

Variable	B ^c (SD)	Z	P	Standardized effect		
				Direct effect	Indirect effect	Total effect
Cues to action → Perceived benefits	0.39(0.17)	2.33	0.019*	0.14	0	0.14
Perceived benefits → Self-care behavior	0.31(0.06)	4.83	0.0001*	0.27	0	0.27
Cues to action → Self-care behaviors	0.57(0.18)	3.14	0.002*	0.18	0.04	0.22

^cB: Regression coefficient, *Statistically significant

taking the above-mentioned issues into account is required in educational planning to highlight the intensity and seriousness of the practices and their probable complications.

According to the results, the relationship between perceived benefits and cues to action with self-care practices was consistent with similar studies.^{30,31}

The findings of the study showed that there is a direct correlation between perceived benefits and self-care practices, i.e. by increasing the perceived benefits, self-care practices improve by 31 percent and these findings are similar to Kasser & Kosma³² study and Taheri et al.³³

As for the relationship between self-care practices and the sexual demographic variable, men eventually benefited more from self-care than women, which contradicts the findings of similar studies.^{34,35} One possible reason for this observation could be the role that men fulfill in the family and society. They are usually more active in the community to provide for the family. They also think they need more self-care to be healthy for meeting the needs of their families. On the other hand, because most of the women were housewives, they had less autonomy and less time to do self-care behaviors. However, our findings are compatible with some studies regarding better self-care practices by men than women.^{36,37}

On the relationship between self-care and the education variable, there is finally a direct association between educational levels and self-care practices. These findings are consistent with those of similar studies.^{11,32}

In this study, there was not a significant relationship between patients' self-care practices and their careers. This result is inconsistent with similar studies,^{35,38} which could be because the majority of the patients under study were housewives without a job and thus there was no occupation diversity. No significant relationship was found between self-care practices and the duration of the disease which contradicts Wilski & Tasiemski findings.³⁵

The findings of the current study showed that the more knowledge, perceived benefits and cues to action in practices increase and perceived barriers decrease, the better self-care is ultimately conducted by the patients.

One of the main constraints of the current study was the population studied. The participants in this study were chosen from among the patients covered by the MS Society; so volunteer bias may exist. On the other hand, in this study, the information obtained was based on the expression the patient has been gathered and there is no possibility of observing the behavior of the investigator. Therefore, a more objective examination and follow-up of the period may lead to in different results. In order to find the effective factors on self-care practices of MS patients to prevent the disease complications, it is essential to do similar research in other provinces with different cultural and social features in order to arrive at more comprehensive and realistic conclusions.

Research Highlights

What is the current knowledge?

- Understanding the factors affecting self-care is one of the important components of therapeutic interventions and care for patients with MS.

What is new here?

- The perceived benefits and cues to action are the main predictors of self-care practices.
- HBM is a good model for planning intervention for self-care practices in patient with MS.

Conclusion

The quality of life of the MS patients is heavily influenced by self-care practices. The results of this study showed that about half of the patients fully accomplish self-care behaviors. It seems this is not enough for these patients. The constructs such as perceived benefits and cues to action can play a vital role in adopting self-care practices. Thus, attending an MS society can help patients to receive proper self-care advice and with their knowledge increased, they will find the right attitude to the disease. Health-care experts and physicians should pay more attention to these factors for encouraging patients with MS to promote self-care practices. Also, according to the results of this study, the reduction of perceived barriers increases the self-care behaviors that can be very effective in the program of self-care and control of MS.

Acknowledgments

The authors wish to extend sincere thanks to the manager and patients of the MS society office in Kerman for their collaboration. We also acknowledge Kerman University of Medical Sciences to support this project financially.

Ethical Issues

The verbal informed consent was obtained from the participants after explaining the goals of the study and assuring the privacy. Also, questionnaires were designed anonymously. This study obtained the ethics code (IR.KMU.REC.1395.298) from the Kerman University of Medical Sciences, Kerman, Iran.

Conflict of Interest

The authors declare no conflict of interest in this study.

Author's Contributions

HH: Conception of the study, data collection, writing manuscript; SB: Conception of the study and design and critically revised the manuscript; JY: Assisted in data analysis and writing the first draft; HM: Assisted in data collection and writing manuscript; IA: Conception of the study and design, critically revised the manuscript, supervision of data collection and analysis.

References

1. Ghanavati R, Namjoyan F, Zadeh HR. A review of possible herbal treatment in multiple sclerosis in traditional persian medicine. *Iranian Journal of Medical Sciences* 2016; 41(3 Suppl):S18.
2. Baecher-Allan C, Kaskow BJ, Weiner HL. Multiple sclerosis:

- mechanisms and immunotherapy. *Neuron* 2018; 97(4): 742-68. doi: 10.1016/j.neuron.2018.01.021
3. Eskandarieh S, Heydarpour P, Elhami SR, Sahraian MA. Prevalence and incidence of multiple sclerosis in Tehran, Iran. *Iran J Public Health* 2017; 46(5): 699-704.
 4. Azami M, YektaKooshali MH, Shohani M, Khorshidi A, Mahmudi L. Epidemiology of multiple sclerosis in Iran: a systematic review and meta-analysis. *PLoS One* 2019; 14(4): e0214738. doi: 10.1371/journal.pone.0214738
 5. Ebrahimi HA, Sedighi B. Prevalence of multiple sclerosis and environmental factors in Kerman province, Iran. *Neurology Asia* 2013; 18(4): 385-9.
 6. Pakdel M, Karin Hedström A, Bidkhorji M, Hadei M, Kazemi Moghaddam V, Sarmadi M, et al. Do socioeconomic factors affect the prevalence of multiple sclerosis in Iran? *Acta Neurol Scand* 2019; 140(5): 328-35. doi: 10.1111/ane.13148
 7. Afrasiabifar A, Mehri Z, Javad Sadat S, Ghaffarian Shirazi HR. The effect of orem's self-care model on fatigue in patients with multiple sclerosis: a single blind randomized clinical trial study. *Iran Red Crescent Med J* 2016; 18(8): e31955. doi: 10.5812/ircmj.31955
 8. Faraji F, Khosravi S, Sajadi M, Farahani Z, Rafiei F. Effect of self-care education on social adaptability in patients with multiple sclerosis. *Iran Red Crescent Med J* 2018; 20(1).
 9. Mlinac ME, Feng MC. Assessment of activities of daily living, self-care, and independence. *Arch Clin Neuropsychol* 2016; 31(6): 506-16. doi: 10.1093/arclin/acw049
 10. Raphaelia Michael MA. What self-care is and what it isn't [Internet]; 2016 [cited 20 Dec 2020]. Available from: <https://psychcentral.com/blog/what-self-care-is-and-what-it-isnt-2#1>.
 11. Oliveira Kumakura ARS, Bezutti LM, Silva JLG, Gasparino RC. Functional and self-care capacity of people with multiple sclerosis. *Rev Lat Am Enfermagem* 2019; 27: e3183. doi: 10.1590/1518-8345.3068.3183
 12. Khodaveisi M, Rahmati M, Falahinia G, Karami M, Vardanjani MM. The effect of orem's self care model on physical quality of life in patients with multiple sclerosis. *Scientific Journal of Nursing, Midwifery and Paramedical Faculty* 2018; 3(4): 24-35. (Persian)
 13. Arnold E. Communication strategies for health promotion and disease prevention. *Interpersonal relationships e-book: professional communication skills for nurses*. 8th ed. Amsterdam: Elsevier; 2019.
 14. Karimy M, Araban M, Zareban I, Taher M, Abedi A. Determinants of adherence to self-care behavior among women with type 2 diabetes: an explanation based on health belief model. *Med J Islam Repub Iran* 2016; 30: 368.
 15. Luquis RR, Kensinger W. Applying the Health Belief Model to assess prevention services among young adults. *Int J Health Promot Educ* 2019; 57(1):37-47. doi: 10.1080/14635240.2018.1549958
 16. Paraska K. Relationship between expanded health belief model variables and mammography screening adherence in women with multiple sclerosis: a pilot study. *Int J MS Care* 2012; 14(3): 142-7.
 17. Wickremasinghe W, Ekanayake L. Effectiveness of a health education intervention based on the health belief model to improve oral health behaviours among adolescents. *Asian Pac J Health Sci* 2017; 4(1): 48-55. doi: 10.21276/apjhs.2017.4.1.10
 18. Simpson Jr S, Taylor BV, Van der Mei I. The role of epidemiology in MS research: Past successes, current challenges and future potential. *Mult Scler J Exp Transl Clin* 2015; 21(8): 969-77.
 19. MorowatiSharifabad M, Momeni Z, Eslami M, Dehghani-Tafti A, Hakimzadeh A. Study of factors associated with self-care behaviors in patients with multiplesclerosis in yazd city based on health belief model. *The Journal of Toloo-e-behdasht* 2016;15(2):82-93. (Persian)
 20. Sedaghat F, Jessri M, Behrooz M, Mirghotbi M, Rashidkhani B. Mediterranean diet adherence and risk of multiple sclerosis: a case-control study. *Asia Pacific Journal of Clinical Nutrition* 2016; 25(2): 377-84.
 21. Leray E, Moreau T, Fromont A, Edan G. Epidemiology of multiple sclerosis. *Rev Neurol (Paris)* 2016; 172(1): 3-13. doi: 10.1016/j.neurol.2015.10.006
 22. Abedini M, Paksersht M, Rafiei A, Valadan R, Amjadi O, Khajavi R, et al. Demographic and clinical characteristics of multiple sclerosis. *Journal of Mazandaran University of Medical Sciences* 2016;25(132):13-22. (Persian)
 23. Dehghani-Tafti A, Mahmoodabad SSM, Morowatisharifabad MA, Ardakani MA, Rezaeipandari H, Lotfi MH. Determinants of self-care in diabetic patients based on health belief model. *Glob J Health Sci* 2015;7(5):33.
 24. Crabtree-Hartman E. Advanced symptom management in Multiple Sclerosis. *Neurol Clin* 2018; 36(1): 197-218. doi: 10.1016/j.ncl.2017.08.015
 25. Didarloo a, Sharafkhani N, Sorkhabi Z, Pourali R. Survey of prostate cancer-preventive behaviors based on the health belief model constructs among male teachers of Urmia city, in 2015. *Journal of Urmia Nursing and Midwifery Faculty* 2016;14(3):271-81. (Persian)
 26. Cook LA. Health Belief Model and healthy consumption: Toward an integrated model. *Journal of Food Products Marketing* 2018; 24(1): 22-38.
 27. Turner A, Kivlahan D, Sloan A, Haselkorn J. Predicting ongoing adherence to disease modifying therapies in multiple sclerosis: utility of the health beliefs model. *Multiple Sclerosis Journal* 2007; 13(9): 1146-52.
 28. Karimy M, Azarpira H, Araban M. Using health belief model constructs to examine differences in adherence to pap test recommendations among Iranian women. *Asian Pac J Cancer Prev* 2017; 18(5): 1389.
 29. Swaggart K, Goggin K, Catley D, Bruce J. Psychological interventions for enhancing adherence to disease-modifying therapies (DMTs) in multiple sclerosis (Protocol). *Cochrane Database of Systematic Reviews* 2016; 11.
 30. Sedlar N, Lainscak M, Mårtensson J, Strömberg A, Jaarsma T, Farkas J. Factors related to self-care behaviours in heart failure: A systematic review of European Heart Failure Self-Care Behaviour Scale studies. *Eur J Cardiovasc Nurs* 2017; 16(4): 272-282. doi: 10.1177/1474515117691644
 31. Rahimi-ghilchalan M, Jalili Z, Farmanbar R. Factors related to preventive behaviors of hepatitis B based on health belief model in high risk workers. *Journal of Guilan University of Medical Sciences* 2017; 25(100): 19-27. (Persian)
 32. Kasser SL, Kosma M. Health beliefs and physical activity behavior in adults with multiple sclerosis. *Disabil Health J* 2012;5(4):261-8.
 33. Taheri S, Momenimovahed Z, Direkvand-Moghadam A, Sharifi N, Farzi S, Shafieian M. The effect of health

- belief-based education on physical activates of nulliparous women: a randomized control trial. *Shiraz E Med J* 2021; 22(3).
34. Lynning, M, Hanehøj K, Karnøe Knudsen A, Skovgaard L. Self-care activities among people with multiple sclerosis in Denmark: use and user characteristics. *Complementary Medicine Research* 2017; 24(4): 240-5.
35. Wilski M, Tasiemski T. Illness perception, treatment beliefs, self-esteem, and self-efficacy as correlates of self-management in multiple sclerosis. *Acta Neurologica Scandinavica* 2016; 133(5): 338-45.
36. Dashti DA, Yousefi H, Maghsoudi J, Etemadifar M. Health promotion behaviors and its corrolation with some of the demographic factors in patients with multiple sclerosis. *Advances in Nursing & Midwifery* 2016; 26(93): 11-9.
37. Moadab F, Ghanbari A, Salari A, Kazemnejad E, Sadaghi Sabet M, Pariad E. Study status of self-care behaviors and gender differences in patients with heart failure. *Journal of Payavard Salamat* 2014; 8(3): 220-34. (Persian)
38. Vijayasingham L, Mairami FF. Employment of patients with multiple sclerosis: the influence of psychosocial-structural coping and context. *Degener Neurol Neuromuscul Dis* 2018; 8: 15-24. doi: 10.2147/DNND.S131729