Iranian Heart Journal; 2019; 20 (3)

Original Article

Relationship Between Health Literacy and Adherence to Treatment in Cardiac Patients

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ABSTRACT

Background: Today, health literacy is introduced as a global issue and debate, and low health literacy appears to be related to nonadherence to healthy lifestyle behaviors and health inequalities. Therefore, the aim of this study was to investigate the health status of patients with cardiovascular disease and its relationship with the patients' adherence status to their drug therapy.

Methods: The present study was a descriptive correlational study. The research population comprised the patients referred to our clinics. Four hundred participants were selected based on the inclusion and exclusion criteria from the research population. The sampling method was simple random sampling. The instrument consisted of 2 parts: the first part evaluated demographic information and the second part was based on the combination of 2 standard instruments of cardiovascular literacy and adherence to treatment, which were used after being modified and reassessed in terms of validity and reliability. The obtained information was analyzed with the SPSS software, version 19. Descriptive and analytical statistics were used.

Results: The Spearman test indicated general health literacy had a significant relationship with treatment (r = 0.31, P < 0.001). This correlation was also observed in relation to the subscales of perception of health (r = 0.27) and health behavior by adherence to treatment (r = 0.29, P < 0.001). If the participants received information through their physicians, they showed a significant relationship between health literacy (in all subscales) and adherence to treatment (P < 0.001).

Conclusions: The results showed a high correlation between health literacy and adherence to treatment. Therefore, considering the importance of cardiovascular diseases, as well as the importance of health literacy and its relevance to adherence to treatment, we suggest that the television sets located in the clinics of the center broadcast educational videos during the waiting period for the clients. ***(Iranian Heart Journal 2019; 20(3): 27-35)***

KEYWORDS: Health literacy, Adherence to treatment, Health behavior

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Received: November 11, 2018 **Accepted:** March 10, 2019

Iranian Heart Journal; 2019; 20 (3)

Cardiovascular disease is one of the most important causes of mortality worldwide. [1] It also plays a significant role in creating complications and increasing treatment costs. [2] In fact, cardiovascular disease is considered a chronic disease, for whose control primary and secondary prevention are crucial. [3]

Cardiovascular patients need to make fundamental alterations to their lifestyle and adhere to their drug therapy in order to reduce their risk factors. Having health literacy and a good understanding of health information will enable individuals to better control their health status. [4]

Health literacy is defined as the degree to which individuals are able to choose, act, process, and communicate, as well as obtain information for their health, so that they can be consciously informed in making decisions vis-à-vis their health. Consequently, having health literacy is an essential component of cardiovascular disease. Low health literacy has been seen as a major problem not only in low- and middle-income countries but also in affluent societies. Thus, anyone may have low health literacy. [5]

Usually, limited information, especially when the condition of cardiovascular disease is alarming, is associated with lower health literacy and worse diagnosis. However, knowing where individuals obtain their health information is one of the formidable challenges today that helps us identify good health information. [3, 6]

The successful prevention of cardiovascular disease requires a high level of health literacy for self-care. High health literacy requires skills such as understanding health information and having active engagement with care team members. Health literacy can be understood as knowledge, motivation, the ability to access, perception, analyze, and utilize the health information of individuals, which lead to making healthy decisions every day. Low health literacy can be associated with social variables such as low education, low income, ethnic minority status, and living alone. Studies have also shown that low levels of education in cardiovascular patients are associated with a higher prevalence of many cardiovascular risk factors that may be associated with lower levels of knowledge. [7]

Today, the role of individuals is emphasized as a central factor in their health management. [8] Some factors such as customer- and patient-orientation and access to health information through the Internet are important convergence factors that have increased the demand for individual participation in decision-making and health management over the past 2 decades. Health literacy is comprised of the cognitive and social skills that determine the motivation and ability of individuals to access, understand, and use information in a manner that preserves and improves their health. In another definition, health literacy includes a set of reading, listening, analysis, decision-making, and ability to apply these skills in health situations that do not necessarily relate to years of education or general reading ability. [9]

Low health literacy is associated with issues such as inadequate understanding of health information, medical education and their follow-up, less involvement in preventive behaviors, late diagnosis of diseases, inability to self-care skills, and nonadherence to healthy lifestyle behaviors. There is also an increase in the number of visits to the doctor and admissions to the hospital in individuals with inadequate health literacy and, in general, they incur more medical expenses. [10]

Today, health literacy is introduced as a global issue and debate. [11] Accordingly, the World Health Organization has recommended that countries of the world create a population of all individuals affected by this in order to monitor and coordinate strategic activities to promote health literacy in different societies. [12] Although many adverse health outcomes are associated with inadequate health literacy, [13] it is still not clear how health literacy is relevant to treatment.

Despite the great importance of health literacy and the importance of adherence to treatment in cardiovascular diseases, such a study has not been carried out so far. The aim of the present study was to investigate the health status of cardiovascular patients and its relationship with the patients' adherence to their drug therapy with a view to helping health planners and authorities and policymakers as an effective tool.

METHODS

The present cross-sectional study sought to determine the correlation between the cardiac health literacy variable and the adherence to treatment variable. The research environment was adult heart clinics, and the research population was comprised of the patients referred to these clinics. The samples were selected based on the inclusion and exclusion criteria of the research population.

Sampling was in the form of simple random sampling. The inclusion criteria of the study were adults aged between 18 and 65 who were referred to the adult clinics in Rajaie Cardiovascular, Medical, and Research Center and were willing to participate in the study. Individuals with mental and perceptional disorders; those who chose not to complete the study questionnaire; and the patients who were referred to congenital heart disease, heart failure, and arrhythmia clinics were excluded. Patients who had the ability to read and write completed the questionnaires themselves, and if they did not have the ability, one of their family members or a researcher's assistant completed the questionnaire by asking them every single item. Concerning the purpose of the research, as well as its confidentiality and its namelessness and the optional participation in the study, the participants were provided with information and oral consent was obtained from them. Prior to sampling, the license was received from the center's Ethics Committee (RHC.AC.IR.REC.1396.59).

The tool consisted of 2 parts. The first part consisted of the demographic information section, which included 10 questions about age, gender, educational level, employment status, marital status, income, disease diagnosis, location, and risk factors. The second part was built on a combination of 2 tools for heart health literacy and adherence to treatment.

The Health Literacy for Iranian Adults tool (HELIA) assesses health literacy in 5 dimensions: access, reading, comprehension, assessment, and decision-making skills. The 8-item Morisy Medication Adherence Scale (MMAS) questionnaire also measures the treatment response. The validity and reliability of these tools were determined by Montazeri (2014) and Plakas (2016). [14, 15] However, after combining these 2 tools and modifying those according to the conditions of the cardiac patients, we re-determined their validity and reliability. Regarding the reliability of the health literacy questionnaire and adherence to treatment, it was determined that the Cronbach alpha was 82% for health literacy and 67% for adherence to treatment. The second part of the tool encompassed 14 questions after modifications and validity and reliability tests. Nine questions measured health literacy in 2 subscales of perception (6 questions) and health behavior (3 questions), and 5 questions measured adherence to cardiac treatment.

The criteria for the assessment of health literacy and adherence to treatment based on the Likert scale were set so that the subjects expressed their views as 3 options (always = 3, sometimes = 2, and never = 1). The health literacy score ranged from 9 to 27, which was divided into 2 subscales of health perception (6–18) and health behavior (3–9) based on the exploratory analysis test. The adherence score was also considered between 5 and 15. Items 10, 11, 13, and 14 were designed in a reverse order to measure the accuracy of the filling of the questionnaires. They were re-scored in reverse to the time of the scoring to analyze in order to calculate the sum of the scores obtained directly

for the individual in the summation of the scores.

The data were analyzed with the SPSS software, version 19. Descriptive statistics were used to determine the mean, standard deviation, frequency, and percentage of personal characteristics and the health literacy level of the subjects, and analytical statistics were used to determine the relationship between heart health literacy and adherence to treatment. The significance level in all the statistical tests was considered to be < 0.05.

One of the limitations of this study was the self-reporting of the tools by individuals with inadequate reading and writing skills. To reduce it, the researcher's assistance asked some of the questions again or provided more explanations. Additionally, the present study is a descriptive-correlational study, which can be repeated with studies with a higher causality ratio.

RESULTS

Findings from 400 participants showed that 53% of the subjects were female and 36% were illiterate. The income level of 61% of the subjects was moderate. In addition, 226 (56%) subjects were from provincial towns. Most of the participants (65%) obtained their disease information through their physician. The medical diagnosis for 264 (66%) individuals was coronary artery disease, and 177 (44%) participants had at least 1 risk factor for hypertension, diabetes mellitus, or hyperlipidemia, for which they received medication (Table 1).

Table 1. Participants' characteristics (N = 400)

Variable		Number	Percentage
Age	20-40	27	6.8
	41-60	164	41.0
	61-80	209	52.2
Gender	Male	189	47.2
	Female	211	52.8
Education	Illiterate	147	36.8
	Middle school	63	15.8
	Diploma	118	29.4
	Academic	72	18.0
Employment	Employed	82	20.5
	Jobless	36	9.0
	Housewife	178	44.5
	Retired	104	26.0
Marital status	Married	331	82.8
	Single	69	17.2
Income	Low	130	32.5
	Medium	246	61.5
	High	24	6.0
Residence	Capital	124	31
	Town	226	56.5
	Village	50	12.5
Medical diagnosis	Coronary	264	66.0
	Non-coronary	136	34.0
Risk factors	No	223	55.8
	Yes	177	44.2
Source of information	Physician	261	65.3
	Internet	36	9.0
	Newspaper, Booklet	21	5.3
	Radio, TV	82	20.4

Risk factors: hypertension, diabetes mellitus or hyperlipidemia

The results of the Kruskal–Wallis and Mann–Whitney tests (Table 2) showed that the health literacy of the study participants had a significant relationship with the level of education and employment status (P <0.001), so that the mean in those with university

education was higher than that of the participants with the rest of education levels (21.4 ± 3.2). This issue was also found in the retired individuals in comparison with those with other employment statuses (19.4 ± 4.92). This significant relationship was observed in the subscale of health perception with gender (P = 0.006) and income (P = 0.03), so that the men had a higher level of health perception (11.5± 3.69) than did the women (10.6 ± 2.93). However, in the subscale of health behavior, this difference was significant only with the level of the education of the individuals (7.77 ± 1.25; P <0.001). Adherence to treatment also showed a significant difference with the variable of employment status (P = 0.001) and the information source (P = 0.006). By comparison with the participants with other employment statuses, the housewives had a higher average score (12.4 ± 2.47). Further, the individuals who received their health information via radio and television were more likely to follow their treatment than were the others (12.9 ± 2.37).

Table 2. Relationship between health literacy/adherence to treatment and demographic variables

Variable		Health Literacy			Adherence to Treatment
		Overall	Perception	Behavior	
Age	20-40	17.9(3.50)	10.9(2.68)	6.9(1.67)	11.7(2.36)
	41-60	18.7(4.30)	11.3(3.2)	7.3(1.59)	12.1(2.62)
	61-80	17.9(4.76)	10.9(3.4)	7.0(1.76)	12.3(2.39)
	P value	0.35	0.58	0.13	0.31
Gender	Male	18.7(4.95)	11.5(3.69)	7.1(1.73)	12.2(2.52)
	Female	17.9(4.04)	10.6(2.93)	7.2(1.65)	12.2(2.45)
	P value	0.36	0.006	0.56	0.97
Education	Illiterate	14.9(3.79)	8.7(2.68)	6.2(1.70)	12.0(2.61)
	Middle school	17.8(4.49)	10.7(3.09)	7.0(1.97)	12.0(2.33)
	Diploma	20.6(2.91)	12.6(2.44)	7.9(1.10)	12.3(2.47)
	Academic	21.4(3.20)	13.7(2.56)	7.77(1.25)	12.7(2.34)
	P value	<0.001	<0.001	<0.001	0.16
Employment	Employed	19.2(4.25)	11.8(3.21)	7.3(1.71)	12.3(2.43)
	Jobless	15.9(3.99)	9.2(3.17)	6.6(1.70)	10.8(2.08)
	Housewife	17.6(4.17)	10.5(3.00)	7.1(1.73)	12.4(2.47)
	Retired	19.4(4.92)	12.1(3.56)	7.2(1.59)	12.3(2.56)
	P value	<0.001	<0.001	0.15	0.001
Marital status	Married	18.4(4.60)	11.2(3.42)	7.1(1.68)	12.2(2.49)
	Single	17.5(3.95)	10.4(2.78)	7.1(1.73)	12.2(2.46)
	P value	0.13	0.05	0.95	0.99
Income	Low	17.8(4.61)	10.7(3.44)	7.1(1.78)	12.0(2.34)
	Medium	18.3(4.29)	11.1(3.18)	7.1(1.61)	12.3(2.55)
	High	19.8(5.74)	12.7(3.95)	7.1(2.04)	12.7(2.62)
	P value	0.09	0.03	0.96	0.19
Residence	Capital	18.2(4.45)	11.2(3.26)	6.9(1.75)	12.3(2.31)
	Town	18.3(4.65)	11.0(3.42)	7.2(1.69)	12.3(2.50)
	Village	18.2(4.03)	10.9(3.16)	7.2(1.51)	11.8(2.83)
	P value	0.91	0.80	0.38	0.62
Medical diagnosis	Coronary	18.1(4.68)	10.9(3.47)	7.1(1.69)	12.2(2.50)
	Non-coronary	18.6(4.14)	11.3(3.04)	7.2(1.68)	12.3(2.46)
	P value	0.33	0.31	0.31	0.59
Risk factors	No	18.2(4.63)	11.0(3.40)	7.1(1.71)	12.2(2.44)
	Yes	18.3(4.35)	11.1(3.26)	7.1(1.67)	12.2(2.55)
	P value	0.82	0.68	0.89	0.59
Source of information	Physician	18.1(4.55)	10.9(3.43)	7.2(1.63)	12.0(2.48)
	Internet	20.3(2.36)	12.5(1.96)	7.7(1.17)	12.5(2.61)
	Newspaper, Booklet	17.3(6.11)	11.0(4.54)	6.3(2.20)	11.9(2.29)
	Radio, TV	18.0(4.42)	11.0(3.03)	6.9(1.82)	12.9(2.37)
	P value	0.05	0.07	0.06	0.006

Health literacy, Mean (SD); adherence to treatment, Mean (SD)

The results of this study showed that the mean health literacy score in the study population was 18.3 ± 4.50 and the mean adherence to treatment score was 12.3 ± 2.48.

The relationship between health literacy and adherence to treatment is shown in Table 3. The Spearman test showed that general health literacy had a significant relationship with treatment (r = 0.31, P < 0.001). This correlation was also observed in relation to the subscales of health perception (r = 0.27) and health behavior with adherence to treatment (r = 0.29) (P < 0.001).

The results of the relationship between health literacy and adherence to treatment in different age groups showed that with increasing age, this correlation was more significant (P <0.001 in the age group of 61–80 years, compared with P = 0.002 and P = 0.05 in the age group of 41–60 years and 20–40 years).

Concerning the relationship between health literacy and adherence to treatment at different levels of education, this relationship was not significant at the diploma level (P = 0.10). Additionally, this relationship was not observed in the unemployed individuals (P = 0.22).

In the respondents with low and moderate income levels, there was a significant relationship between health literacy and adherence to treatment (P < 0.001). If the participants received their information through a physician, there was a significant relationship between health literacy (in all subscales) with adherence to treatment (P < 0.001), while receiving information via the Internet as well as newspapers, magazines, and booklets did not show a meaningful relationship between the subscale of health perception and adherence to treatment (P = 0.39 and P = 0.06).

Table 3. Relationship between health literacy and adherence to treatment

Variable		Health Literacy		
		Overall	Perception	Behavior
Adherence to Treatment		0.31(<0.001)	0.27(<0.001)	0.29(<0.001)
Age	20-40	0.37(0.05)	0.20(0.31)	0.39(0.04)
	41-60	0.23(0.002)	0.19(0.01)	0.22(0.003)
	61-80	0.38(<0.001)	0.34(<0.001)	0.34(<001)
Gender	Male	0.35(<0.001)	0.28(<0.001)	0.38(<0.001)
	Female	0.25(<0.001)	0.25(<0.001)	0.18(0.008)
Education	Illiterate	0.38(<0.001)	0.040(<0.001)	0.33(<0.001)
	Middle school	0.27(0.02)	0.24(0.05)	0.29(0.01)
	Diploma	0.15(0.10)	0.07(0.43)	0.17(0.06)
	Academic	0.48(<0.001)	0.46(<0.001)	0.31(0.008)
Employment	Employed	0.37(0.001)	0.27(0.01)	0.30(0.005)
	Jobless	0.20(0.22)	0.23(0.16)	0.16(0. 34)
	Housewife	0.24(0.001)	0.24(0.001)	0.20(0.007)
	Retired	0.29(0.002)	0.25(0.009)	0.39(<0.001)
Marital status	Married	0.31(<0.001)	0.27(<0.001)	0.29(<0.001)
	Single	0.27(0.02)	0.25(0.03)	0.25(0.03)
Income	Low	0.40(<0.001)	0.38(<0.001)	0.33(<0.001)
	Medium	0.27(<0.001)	0.22(<0.001)	0.26(<0.001)
	High	0.10(0.63)	0.08(0. 69)	0.29(0.16)
Residence	Capital	0.26(0.003)	0.23(0.01)	0.21(0.01)
	Town	0.29(<0.001)	0.25(<0.001)	0.30(<0.001)
	Village	0.53(<0.001)	0.48(<0.001)	0.45(0.001)
Medical diagnosis	Coronary	0.32(<0.001)	0.29(<0.001)	0.30(<0.001)
	Non-coronary	0.28(0.001)	0.23(0.007)	0.26(0.002)
Risk factors	No	0.38(<0.001)	0.35(<0.001)	0.33(<0.001)
	Yes	0.21(0.004)	0.17(0.02)	0.24(0.001)
Source of information	Physician	0.26(<0.001)	0.23(<0.001)	0.22(<0.001)
	Internet	0.47(0.004)	0.14(0.39)	0.43(0.008)
	Newspaper, Booklet	0.66(0.001)	0.41(0.06)	0.74(<0.001)
	Radio, TV	0.39(<0.001)	0.33(0.002)	0.38(<0.001)

Health literacy, r (P value)

DISCUSSION

The results of this study showed that general health literacy had a significant relationship with treatment. In 2017, Rolls et al[11] reported a significant relationship between the knowledge of patients about anticoagulant drugs and their health literacy and adherence to treatment. In 2017, Lee et al [12] also showed that health literacy was a strong predictor of treatment. The authors also showed that the health status, the use of magnifying glasses, and the presence of a helpful companion were important factors in adherence to treatment and concluded that increased health literacy would lead to increased adherence to treatment in the elderly.

Various studies have demonstrated a significant relationship between health literacy and general health status, referral to a physician, performing preventive behaviors, adherence to diets, and quality of life. [13, 16, 17] However, in a number of studies, there was no significant relationship between the level of health literacy and referral to a physician. [18-20] The reason for the discrepancies in the results of various studies can be due to differences in the factors affecting the use of health literacy in different societies including the level of individuals' awareness, the education provided, the characteristics of the health system, and the socioeconomic and cultural status of individuals.

We found that the health literacy of our whole study population had a significant relationship with the level of education and the employment status. In addition, our male respondents had a higher level of health perception, while previous studies have shown that female human life expectancy is extremely higher than that of men. [21, 22] In a study by Zadirad et al [10] in 2015, individuals with higher levels of health literacy appeared to have received more outpatient referrals because of high levels of education, health awareness, and a concern about personal health. Moreover, individuals with adequate levels of health had more knowledge of screening tests and the need for these tests, which is consistent with the results of our study.

We also observed a significant relationship between the individuals' health behavior and adherence to treatment, so that they referred to the clinic or the emergency department upon seeing the symptoms of heart disease. However, Lee et al [12] did not find a significant relationship between the level of health literacy and referral to the emergency department.

Cho et al [20] in 2008 also found that emergency visits were significantly reduced by increasing health literacy. The results of an investigation by Hardie et al [23] in 2011 showed that individuals with inadequate health status were more likely to refer to the emergency department. The reason for the difference in the results of these studies is that the emergency situation may occur for any person regardless of the level of health literacy and the person may be forced to visit the emergency department. This referral is caused by acute conditions and is not related to health literacy.

The relationship between health behaviors and adherence to treatment in the present study indicates that individuals avoid doing things or using substances that exacerbate heart disease. A study by Scoot et al [24] in 2002 also found that individuals with high levels of health literacy were more likely to perform preventive behaviors than those with inadequate health literacy. The reason for this is the awareness of highly educated individuals about preventive behaviors and their higher sensitivity and concern about health.

The majority of the participants in the current study obtained their health-related information from their physician and secondarily from radio and television. Izadirad et al [10] in 2015 also reported that health staff members, followed by TV and radio, were the most important source of health information for their respondents. Andrus et al [25] in 2002 reported that the majority of their contributors introduced TV as the first source of health information because low educated individuals often sought

information from non-print sources such as TV, radio, friends, and family. Kvedar et al [26] in 2014 concluded that medical technologies such as telemedicine were able to decrease costs and improve health-related information.

The results of our study showed the important role of physicians, health staff, TV, and radio in providing health-related information. Individuals need to be able to understand and use the information provided to them in their proprietary healthcare environment in order to make appropriate health decisions. Service providers should be aware of patients' ability to process health information in order to improve their outcomes, and they should also be able to transfer information to patients with different levels of health literacy. [27]

CONCLUSIONS

The results of the current study showed that the health literacy of patients referred to the clinics of Rajaie Cardiovascular, Medical, and Research Center was not acceptable. On the other hand, there was a high correlation between health literacy and adherence to treatment in these patients. Therefore, considering the importance of cardiovascular disease, as well as the importance of health literacy and its relationship with adherence to treatment, we suggest that the televisions sets located in the clinics of the center broadcast educational videos during the waiting period for the clients. In addition, these educational videos should be uploaded on the center's Web site for public education. Furthermore, a station with qualified and well-informed staff should be based in the clinic with the aim of increasing the awareness and heart literacy of patients and families; this could boost patients' adherence to treatment, reduce the number of visits to the doctor and hospitalization, and subsequently lessen medical expenses. It would also be advisable that E-health and telemedicine systems be launched for cardiac patients. Needless to say, the role of this site in public education should be evaluated in further studies.

Acknowledgments

Authors hereby express their thanks to Mrs. Sona Elyasi for her valuable editing.

REFERENCES

1. Members WG, Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, et al. Heart disease and stroke statistics—2017 update: a report from the American Heart Association. Circulation. 2017;135(10):e146.

2. Network CC. The Ontario cardiac rehabilitation pilot project: Report and recommendations. Toronto, ON: Cardiac Care Network. 2002.

3. de Melo Ghisi GL, da Silva Chaves GS, Britto RR, Oh P. Health literacy and coronary artery disease: A systematic review. Patient education and counseling. 2018;101(2):177-84

4. Aldcroft SA, Taylor NF, Blackstock FC, O'Halloran PD. Psychoeducational rehabilitation for health behavior change in coronary artery disease: a systematic review of controlled trials. Journal of cardiopulmonary rehabilitation and prevention. 2011;1(5):273-81

5. Berkman ND, Davis TC, McCormack L. Health literacy: what is it? Journal of health communication. 2010;15(S2):9-19.

6. Santos RD. Better health literacy can make the difference when control of risk factors for cardiovascular disease and quality of life are concerned. SAGE Publications Sage UK: London, England; 2017.

7. Aaby A, Friis K, Christensen B, Rowlands G, Maindal HT. Health literacy is associated with health behaviour and self-reported health: A large population-based study in individuals with cardiovascular disease. European journal of preventive cardiology. 2017;24(17):1880-8.

8. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: an updated systematic review. Annals of internal medicine. 2011;155(2):97-107.

9. Carollo S. Low health literacy in older women: The influence of patient–clinician relationships. Geriatric Nursing. 2015;36(2):S38-S42.

10. Izadirad H, Zareban I. The relationship of health literacy with health status, preventive behaviors and health services utilization in Baluchistan, Iran. Journal of Education and Community Health. 2015;2(3):43-50.

11. Rolls CA, Obamiro KO, Chalmers L, Bereznicki LR. The relationship between knowledge, health literacy, and adherence among patients taking oral anticoagulants for stroke thromboprophylaxis in atrial fibrillation. Cardiovascular therapeutics. 2017;35(6):e12304.

12. Lee Y-M, Yu HY, You M-A, Son Y-J. Impact of health literacy on medication adherence in older people with chronic diseases. Collegian. 2017;24(1):11-8.

13. Kooshyar H, Shoorvazi M, Dalir Z, Hosseini M. Health literacy and its relationship with medical adherence and health-related quality of life in diabetic community-residing elderly. Journal of Mazandaran University of Medical Sciences. 2014;23(1):134-43.

14. Montazeri A, Tavousi M, Rakhshani F, Azin SA, Jahangiri K, Ebadi M, et al. Health Literacy for Iranian Adults (HELIA): development and psychometric properties. 2014.

15. Plakas S, Mastrogiannis D, Mantzorou M, Adamakidou T, Fouka G, Bouziou A, et al. Validation of the 8-item Morisky Medication Adherence Scale in chronically ill ambulatory patients in rural Greece. Open Journal of Nursing. 2016;6(03):158.

16. Javadzade SH, Sharifirad G, Radjati F, Mostafavi F, Reisi M, Hasanzade A. Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. J Educ Health Promot. 2012;1:31. pp: 1-7.

17. Walker J, Pepa C, Gerard PS. Assessing the health literacy levels ofpatients using selected hospital services. Clinical Nurse Specialist. 2010;24(1):31-7.

18. Arozullah AM, Lee SYD, Khan T, Kurup S, Ryan J, Bonner M, et al. The roles of low literacy and social support in predicting the preventability of hospital admission .Journal of general internal medicine. 2006;21(2):140-5.

19. Baker DW, Gazmararian JA, Williams MV, Scott T, Parker RM, Green D, et al. Health literacy and use of outpatient physician services by Medicare managed care enrollees. Journal of General Internal Medicine. 2004;19(3):215-20.

20. Cho YI, Lee S-YD, Arozullah AM, Crittenden KS. Effects of health literacy on health status and health service utilization amongst the elderly. Social science & medicine. 2008;66(8):1809-16.

21. Csete J, Kamarulzaman A ,Kazatchkine M, Altice F, Balicki M, Buxton J, et al. Public health and international drug policy. The Lancet. 2016;387(10026):1427-80.

22. Barford A, Dorling D, Smith GD, Shaw M. Life expectancy: women now on top everywhere: during 2006, even in the poorest countries, women can expect to outlive men. BMJ: British Medical Journal. 2006;332(7545):808.

23. Hardie NA, Kyanko K, Busch S, LoSasso AT, Levin RA. Health literacy and health care spending and utilization in a consumer-driven health plan. Journal ofHealth Communication. 2011;16(sup3):308-21.

24. Scott TL, Gazmararian JA, Williams MV, Baker DW. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. Medical care. 2002;40(5):395-404.

25. Andrus MR, RothMT. Health literacy: a review. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy. 2002;22(3):282-302.

26. Kvedar J, Coye MJ, Everett W. Connected health: a review of technologies and strategies to improve patient care with telemedicine and telehealth. Health Affairs. 2014;33(2):194-9.

27. Headley AJ, Harrigan J. Using the pregnancy perception of risk questionnaire to assess health care literacy gaps in maternal perception of prenatal risk. Journal of the national medical association. 2009;101(10):1041-5.