



Treatment Adherence in Patients with Hypertension: A Cross Sectional Study from Southeast of Iran

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Abstract

Background: Poor adherence to antihypertensive treatment has been a global challenge. It is necessary for health care providers to identify the factors affecting treatment adherence.

Objectives: The present study aimed to investigate the adherence to treatment and its related factors in patients with hypertension.

Methods: A cross sectional study carried out from September 2017 to March 2018 on 600 patients with hypertension who were covered by urban community health centers in Kerman, Iran. The Persian version of Morisky medication adherence scale (P-MMAS-8) and hypertensive treatment adherence scale (HTAS) were used for assessing adherence to the medication and treatment, respectively. Data was analyzed by SPSS software version 19.0 using Independent *t*-test, ANOVA and logistic regression.

Results: The mean age of participants was 56.44 ± 12.3 years, with the majority of them (70.0%) being female. Poor adherence to medication and treatment was found in 304 (50.7%) and in 238 (39.7%) patients, respectively. Age, level of education, and the presence of concurrent medical disease and psychological disorder significantly predicted the adherence to treatment.

Conclusions: Poor adherence was common among hypertensive patients in our primary health care setting. Therefore, it is necessary for our health care providers to identify the factors associated with poor adherence to be intervened timely.

Keywords: Hypertension, Medication Adherence, Treatment Adherence, Chronic Diseases, Iran

1. Background

Hypertension is one of the key risk factors for cardiovascular diseases. According to World Health Organization, about one billion people are affected by this worldwide. It was estimated that raised blood pressure kills nine million people every year (1).

Along with access to effective and inexpensive medicines, increasing patients' awareness toward the importance of adherence to medications, and healthy behaviors is essential in controlling the disease and reducing its complications (1-3). Despite being aware of this fact, poor adherence to antihypertensive treatment has been a global challenge and its prevalence varies from 10% to more than 60% in different regions (4-6).

According to National Action Plan for prevention and control of non-communicable diseases in Iran (IraPEN), a 25% relative reduction has been considered in the prevalence of hypertension by 2020 (7). To achieve this goal, in addition to timely diagnosis and treatment of hypertension, the adherence to the treatment and its related factors should be promoted (8).

2. Objectives

Recent literatures revealed that treatment adherence, especially for chronic diseases, has been taken into consideration in our country. Different tools used to measure the adherence and its related factors in hypertensive patients such as Morisky medication adherence scale (MMAS) as well as treatment adherence questionnaire for patients with hypertension (TAQPH). Psychometric properties of the Persian version of these tools have been confirmed, however, most of them were carried out in a tertiary health care center or with a smaller sample size (8-10). Therefore, the present study aimed to investigate the adherence to treatment and its related factors in patients with hypertension who were referring to urban community health centers in Kerman province, Iran.

3. Methods

A cross sectional study carried out from September 2017 to March 2018. Our statistical population was the patients with hypertension who were covered by urban com-

munity health centers in Kerman (Kerman province, south eastern area of Iran). A total of 600 patients were selected using multistage sampling method. The inclusion criteria included individuals over the age of 20 and informed consent to participate. The exclusion criteria included the patients with more than 10% unanswered questions.

A trained interviewer measured the participants' blood pressure with a sphygmomanometer (ALPK2, Japan) twice with an interval of 5 minutes in a seated position. The average of two measurements was considered. It was required for the patient to avoid caffeine intake and smoking 30 minutes before the measurement.

Data was collected through the structured interview. Demographic data such as age, marital status, level of education, household income and employment status, and data related to the disease were recorded. The Persian version of Morisky medication adherence scale (P-MMAS-8) (9) and hypertensive treatment adherence scale (HTAS) (11) were used for assessing adherence to the medication and treatment, respectively. MMAS-8 is a tool, which assess the medication taking behaviours. It has seven items with a yes/no response and one item with 5-point Likert response. The range of scores was from zero to eight. The score eight is considered as good, six to less than eight as moderate, and less than six as poor adherence (12). Acceptable reliability and validity were reported for the original and other versions (including Persian one) (12-14). Moharamzad et al. revealed that the Persian version of the MMAS-8 had acceptable validity and reliability (Cronbach's Alpha coefficient: 0.69 and ICC = 0.940) in Iranian hypertensive patients (15).

HTAS was developed and validated by Dehghan et al. in 2014. This scale has 23 items with four subscales including adherence to medication and follow up programs (8 items), to dietary recommendations (10 items), physical activity (2 items), and smoking (3 items). Responses to the items are based on 5-point Likert scale (no = 1, rarely = 2, sometimes = 3, most times = 4, and always = 5). Some items are scored in reverse order. Accordingly, the range of scores varies from 23 to 115. The score of 86 and above means being adherent to the treatment. Psychometric analysis of this scale revealed acceptable validity and reliability (Alfa Cronbach 0.76, intra class correlation coefficient = 0.74) (11).

In a pilot study on 60 patients, the internal consistency of both questionnaires evaluated and determined 0.80 and 0.81 for P-MMAS-8 and HTAS, respectively. These patients then entered the sample size.

Data was analyzed by SPSS software version 19.0 (SPSS Inc., Chicago, IL, USA) using Independent *t*-test, ANOVA, and logistic regression.

Our study was approved by The Ethics Committee of Kerman University of Medical Sciences (Reg. No. 96000108). The interviews were completed anonymously

and voluntarily. Each interview lasted approximately 10 to 15 minutes. The participants were assured that the data would be used only for research purposes.

4. Results

A total of 600 patients with hypertension were interviewed. The mean age of participants was 56.44 ± 12.3 years with a minimum and maximum of 20 and 87 years, respectively. The majority of participants (70.0%) were female and married (77.0%) with a monthly household income of less than 200 USD (50.5%) (Table 1). The mean of the participants' systolic and diastolic blood pressure were 138.17 ± 15.0 and 83.63 ± 8.4 , respectively.

The mean score on P-MMAS-8 was 5.72 ± 1.9 . Accordingly, 141 (23.5%) patients were adherent to medication, 155 (25.8%) had moderate adherence, and 304 (50.7%) poor adherence. The mean score on HTAS was 87.64 ± 10.3 , upon which 238 (39.7%) patients had poor adherence to the treatment. There was a positive statistically significant correlation between the scores ($r = 0.4$, $P = 0.001$). There was no clinically and statistically significant difference in the mean of systolic and diastolic blood pressures between adherent and non-adherent patients ($P \geq 0.05$).

Table 2 shows the participants' scores according to demographic data and the presence of concurrent disease. Accordingly, compared to other groups, hypertensive patients with a household monthly income of 200 to 400 USD and who had concurrent medical disease (other than hypertension) had significantly higher medication and treatment adherence scores. The patient with high school diplomas and who had no concurrent psychological disorder had significantly higher treatment adherence scores. This was not about medication adherence scores.

There was a positive statistically significant weak correlation between P-MMAS-8 ($r = 0.2$, $P = 0.001$), HTAS ($r = 0.1$, $P = 0.006$) scores, and age. There were no statistically significant correlations between the scores and the duration of diagnosis and treatment ($P > 0.05$).

Age, level of education, and the presence of concurrent medical disease and psychological disorder significantly predicted the adherence to treatment in logistic regression (Table 3).

5. Discussion

The present study revealed that more than half of the hypertensive patients who participated in our study had poor adherence to their medications based on P-MMAS-8. In a systematic review, Nielson et al. revealed remarkable

Table 1 . Demographic Data Among Patients with Hypertension Referred to Health Centers

Variables	Values ^a
Age	56.44 ± 12.3
Gender	
Male	181 (30.0)
Female	419 (70.0)
Level of education	
Under high school diploma	373 (62.2)
High school diploma	172 (28.7)
Academic	55 (9.1)
Employment status	
Employed	75 (12.5)
Self employed	44 (7.3)
Unemployed	21 (3.5)
Housekeeper	321 (53.5)
Retired	114 (19.0)
Others	25 (4.2)
Marital status	
Married	154 (75.9)
Single	45 (22.2)
Divorced	4 (2.0)
Widow/widower	165 (81.3)
Household monthly income (USD)	
Less than 200	303 (50.5)
200 - 400	281 (46.8)
≥ 400	16 (2.7)
Concurrent medical disease	
Yes	409 (68.2)
No	191 (31.8)
Concurrent psychological disorder	
Yes	69 (11.5)
No	531 (88.5)

^aValues are expressed as mean ± SD or No. (%).

variation in non adherence to anti-hypertensive medications (25.45% - 63.35%) in low and middle income countries (16). Moharamzad et al. found, in a multi-center study in Iran, that more than half of the hypertensive patients had poor adherence, which is compatible with the present study (15). Given that adherence to medication and other non-pharmacological recommendations is necessary to control the disease and prevent its complications, measuring adherence to treatment by a simple, valid, and reliable instrument should be included in follow-up visits

in primary health care (17, 18).

MMAS-8 is known as a valid and reliable tool for measuring adherence to medications and its psychometric properties previously confirmed different languages and cultures including Persian (14, 16, 19). In Iran, the majority of studies regarding this issue have been carried out in a tertiary health care center, except one of them recently done in primary health care settings, however, with a sample size less than the one in the present study (8, 10, 12, 16, 20).

The point that should be noted is that in addition to measuring medication adherence, other aspects of hypertensive treatment adherence such as dietary recommendations, weight control, physical activity, and stress management should also be considered. Therefore, it seems that in spite of excellent validity and reliability of this tool, its use in clinical setting may be necessary, however, not sufficient (9, 21, 22). HTAS was used in the present study to evaluate treatment adherence and accordingly, more than one third of patients were poor adherent. Villalva et al. and He et al. found about 30% - 35% of patient with hypertension had low adherence to treatment, which is consistence with our study (3, 23).

To increase adherence, it is necessary to identify the factors affecting it (24). The present study revealed higher age and education, the presence of concurrent medical disease were associated with higher adherence while those who had psychological disorder reported lower adherence. Other variables such as gender, household income, marital status, job, and duration of diagnosis were not statistically significant predictors. Son and Won found that depression has a negative impact on medication adherence among patients with hypertension, which is consistency with present study (24). Therefore, it is necessary that the mental health status among hypertensive patients be evaluated in follow up visits, especially in patients with low adherence, so that we can have timely interventions.

In accordance with our study, Ma et al. and Napolitano et al. revealed that higher education is associated with higher adherence (25, 26). It is probably due to having more awareness regarding the importance of regular taking of medications and self-care among patients with higher education. On the other hand, educational interventions should be considered for patients with lower education to enhance their awareness and sensitivity regarding self-care and regular taking of medications. Zhao et al. revealed patients with coronary heart disease (CHD) who are knowledgeable had more medication adherence (27). Sweileh et al. also found diabetic patients who had a higher knowledge score and those with strong beliefs toward the necessity of their medication were more adherent (28).

According to our finding, patients who reported con-

Table 2. The Comparison of the Participants' Adherence Scores According to Demographic Data^a

	HTAS	P Value	P-MMAS-8	P Value
Gender		0.70		0.64
Male	87.39 (10.7)		5.77 (2.0)	
Female	87.74 (10.2)		5.69 (1.9)	
Level of education		0.03*		0.24
Under high school diploma	86.9 (10.3)		5.8 (1.9)	
High school diploma	89.3 (10.2)		5.5 (2.0)	
Academic	86.8 (11.1)		5.6 (2.0)	
Employment status		0.15		0.16
Unemployed	83.5 (10.3)		6.0 (1.70)	
Employed	86.8 (10.1)		5.2 (1.9)	
Self employed	86.8 (13.1)		6.1 (2.0)	
Retired	89.4 (10.2)		5.9 (1.8)	
Housekeeper	87.6 (10.2)		5.6 (2.0)	
Others	86.3 (7.6)		5.4 (2.1)	
Marital status		0.46		0.08
Single	85.6 (7.7)		6.4 (1.7)	
Married	87.8 (10.3)		5.6 (2.0)	
Divorced	83.5 (15.7)		5.0 (2.8)	
Widow/widower	87.3 (10.3)		6.0 (1.6)	
Household monthly income (USD)		0.001*		0.04*
Less than 200	85.9 (10.5)		5.5 (2.0)	
200 - 400	89.6 (9.8)		5.9 (1.8)	
≥ 400	84.8 (10.5)		5.4 (2.7)	
Concurrent medical disease		0.007*		0.01*
No	85.9 (10.8)		5.4 (2.1)	
Yes	88.4 (10.0)		5.8 (1.9)	
Concurrent psychological disorder		0.01*		0.12
No	88.0 (10.2)		5.7 (1.9)	
Yes	84.6 (11.0)		5.3 (1.9)	

^aValues are expressed as mean (SD).

current medical diseases had higher adherence to anti-hypertensive treatments. In addition, Grant et al. revealed higher daily medication adherence (DMA) among patients with more concurrently prescribed medicines (29). Contrary to this, Napolitano et al. found that among patients with chronic conditions, those who took a lower number of total pills per day had higher adherence (26).

We did not find clinically significant differences in the mean of systolic and diastolic blood pressures between adherent and non-adherent patients. It may be due to the fact that the patients' adherence measured based on their self-

report and precise evidence of their actual behaviours may not be provided. In addition, our cross-sectional study was limited temporally in terms of the examination of relationships.

Despite these limitations, one of the strengths of the present study was that it was conducted in a primary health care setting with a large sample size compared to previous studies in Iran.

5.1. Conclusions

Poor adherence is common among hypertensive patients in our primary health care setting. Therefore, it is

Table 3. The Association Between Selected Characteristics and Adherence Status According to Hypertensive Treatment Adherence Scale (HTAS) in Logistic Regression

Characteristic	Adjusted OR	95% Confidence Intervals	P Value
Age	1.02	1.00 - 1.04	0.02
Level of education			0.03
< High school diploma	1	-	
≥ High school diploma	3.51	2.04 - 6.03	
Concurrent medical disease			0.02
Yes	1	-	
No	0.64	0.44 - 0.93	
Concurrent psychological disorder			0.02
Yes	1	-	
No	1.88	1.11 - 3.20	

necessary for health care providers to identify the factors associated with poor adherence to be intervened timely.

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References

- World Health Organization. A global brief on hypertension. 2018. Available from: http://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/.
- Cabral AC, Castel-Branco M, Caramona M, Fernandez-Llimos F, Figueiredo IV. Developing an adherence in hypertension questionnaire short version: MUAH-16. *J Clin Hypertens (Greenwich)*. 2018;**20**(1):118–24. doi: [10.1111/jch.13137](https://doi.org/10.1111/jch.13137). [PubMed: [29171719](https://pubmed.ncbi.nlm.nih.gov/29171719/)].
- Villalva CM, Alvarez-Muino XLL, Mondelo TG, Fachado AA, Fernandez JC. Adherence to treatment in hypertension. *Adv Exp Med Biol*. 2017;**956**:129–47. doi: [10.1007/5584_2016_77](https://doi.org/10.1007/5584_2016_77). [PubMed: [27757938](https://pubmed.ncbi.nlm.nih.gov/27757938/)].
- Agbor VN, Takah NF, Aminde LN. Prevalence and factors associated with medication adherence among patients with hypertension in sub-Saharan Africa: Protocol for a systematic review and meta-analysis. *BMJ Open*. 2018;**8**(3). e020715. doi: [10.1136/bmjopen-2017-020715](https://doi.org/10.1136/bmjopen-2017-020715). [PubMed: [29549213](https://pubmed.ncbi.nlm.nih.gov/29549213/)]. [PubMed Central: [PMC5857663](https://pubmed.ncbi.nlm.nih.gov/PMC5857663/)].
- Al-Daken LI, Eshah NF. Self-reported adherence to therapeutic regimens among patients with hypertension. *Clin Exp Hypertens*. 2017;**39**(3):264–70. doi: [10.1080/10641963.2016.1247164](https://doi.org/10.1080/10641963.2016.1247164). [PubMed: [28448187](https://pubmed.ncbi.nlm.nih.gov/28448187/)].
- Natarajan N, Putnam W, Van Aarsen K, Beverley Lawson K, Burge F. Adherence to antihypertensive medications among family practice patients with diabetes mellitus and hypertension. *Can Fam Physician*. 2013;**59**(2):e93–e100. [PubMed: [23418264](https://pubmed.ncbi.nlm.nih.gov/23418264/)]. [PubMed Central: [PMC3576963](https://pubmed.ncbi.nlm.nih.gov/PMC3576963/)].
- Iranian National Committee for NCDs Prevention and Control. *National action plan for prevention and control of non communicable diseases and the related risk factors in the Islamic Republic of Iran 2015-2025*. Tehran: AFTAB-E-ANDISHE; 2015.
- Sarayani A, Jahangard-Rafsanjani Z, Hadjibabaie M, Ahmadvand A, Javadi M, Gholami K. A comprehensive review of adherence to diabetes and cardiovascular medications in Iran; implications for practice and research. *J Diabetes Metab Disord*. 2013;**12**(1):57. doi: [10.1186/2251-6581-12-57](https://doi.org/10.1186/2251-6581-12-57). [PubMed: [24360356](https://pubmed.ncbi.nlm.nih.gov/24360356/)]. [PubMed Central: [PMC3891984](https://pubmed.ncbi.nlm.nih.gov/PMC3891984/)].
- Dehghan M, Dehghan-Nayeri N, Iranmanesh S. Translation and validation of the Persian version of the treatment adherence questionnaire for patients with hypertension. *ARYA Atheroscler*. 2016;**12**(2):76–86. [PubMed: [27429627](https://pubmed.ncbi.nlm.nih.gov/27429627/)]. [PubMed Central: [PMC4933746](https://pubmed.ncbi.nlm.nih.gov/PMC4933746/)].
- Nayeri ND, Dehghan M, Iranmanesh S. Being as an iceberg: hypertensive treatment adherence experiences in southeast of Iran. *Glob Health Action*. 2015;**8**:28814. doi: [10.3402/gha.v8.28814](https://doi.org/10.3402/gha.v8.28814). [PubMed: [26395925](https://pubmed.ncbi.nlm.nih.gov/26395925/)]. [PubMed Central: [PMC4579246](https://pubmed.ncbi.nlm.nih.gov/PMC4579246/)].
- Dehghan M, Nayri N, Iranmanesh S. *Development and validation of hypertensive treatment adherence scale [Dissertation]*. Kerman University of Medical Science; 2015.
- Dehghan M, Nayeri ND, Karimzadeh P, Iranmanesh S. Psychometric properties of the Persian version of the Morisky medication adherence scale-8. *Br J Med Med Res*. 2015;**9**(9):1–10. doi: [10.9734/bjmmr/2015/17345](https://doi.org/10.9734/bjmmr/2015/17345).
- Lee WY, Ahn J, Kim JH, Hong YP, Hong SK, Kim YT, et al. Reliability and validity of a self-reported measure of medication adherence in patients with type 2 diabetes mellitus in Korea. *J Int Med Res*. 2013;**41**(4):1098–110. doi: [10.1177/0300060513484433](https://doi.org/10.1177/0300060513484433). [PubMed: [23860015](https://pubmed.ncbi.nlm.nih.gov/23860015/)].
- Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)*. 2008;**10**(5):348–54. [PubMed: [18453793](https://pubmed.ncbi.nlm.nih.gov/18453793/)]. [PubMed Central: [PMC2562622](https://pubmed.ncbi.nlm.nih.gov/PMC2562622/)].
- Moharamzad Y, Saadat H, Nakhjavan Shahraki B, Rai A, Saadat Z, Aerab-Sheibani H, et al. Validation of the Persian version of the 8-item Morisky medication adherence scale (MMAS-8) in Iranian hypertensive patients. *Glob J Health Sci*. 2015;**7**(4):173–83. doi: [10.5539/gjhs.v7n4p173](https://doi.org/10.5539/gjhs.v7n4p173). [PubMed: [25946926](https://pubmed.ncbi.nlm.nih.gov/25946926/)]. [PubMed Central: [PMC4802120](https://pubmed.ncbi.nlm.nih.gov/PMC4802120/)].

16. Nielsen JO, Shrestha AD, Neupane D, Kallestrup P. Non-adherence to anti-hypertensive medication in low- and middle-income countries: A systematic review and meta-analysis of 92443 subjects. *J Hum Hypertens*. 2017;**31**(1):14–21. doi: [10.1038/jhh.2016.31](https://doi.org/10.1038/jhh.2016.31). [PubMed: [27306087](https://pubmed.ncbi.nlm.nih.gov/27306087/)].
17. Ruppar TM, Dunbar-Jacob JM, Mehr DR, Lewis L, Conn VS. Medication adherence interventions among hypertensive black adults: A systematic review and meta-analysis. *J Hypertens*. 2017;**35**(6):1145–54. doi: [10.1097/HJH.0000000000001260](https://doi.org/10.1097/HJH.0000000000001260). [PubMed: [28106662](https://pubmed.ncbi.nlm.nih.gov/28106662/)].
18. Ahmadipour H, Farajzadegan Z, Kachoei A, Pirdehghan A. Secondary prevention by enhancing adherence in diabetic patients. *Int J Prev Med*. 2010;**1**(1):50–5. [PubMed: [21677766](https://pubmed.ncbi.nlm.nih.gov/21677766/)] [PubMed Central: [PMC3075488](https://pubmed.ncbi.nlm.nih.gov/PMC3075488/)].
19. Abegaz TM, Shehab A, Gebreyohannes EA, Bhagavathula AS, Elnour AA. Nonadherence to antihypertensive drugs: A systematic review and meta-analysis. *Medicine (Baltimore)*. 2017;**96**(4). e5641. doi: [10.1097/MD.0000000000005641](https://doi.org/10.1097/MD.0000000000005641). [PubMed: [28121920](https://pubmed.ncbi.nlm.nih.gov/28121920/)] [PubMed Central: [PMC5287944](https://pubmed.ncbi.nlm.nih.gov/PMC5287944/)].
20. Mahmoudian A, Zamani A, Tavakoli N, Farajzadegan Z, Fathollahi-Dehkordi F. Medication adherence in patients with hypertension: Does satisfaction with doctor-patient relationship work? *J Res Med Sci*. 2017;**22**:48. doi: [10.4103/jrms.JRMS_205_16](https://doi.org/10.4103/jrms.JRMS_205_16). [PubMed: [28567067](https://pubmed.ncbi.nlm.nih.gov/28567067/)] [PubMed Central: [PMC5426097](https://pubmed.ncbi.nlm.nih.gov/PMC5426097/)].
21. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;**311**(5):507–20. doi: [10.1001/jama.2013.284427](https://doi.org/10.1001/jama.2013.284427). [PubMed: [24352797](https://pubmed.ncbi.nlm.nih.gov/24352797/)].
22. Ma C, Chen S, You L, Luo Z, Xing C. Development and psychometric evaluation of the Treatment Adherence Questionnaire for Patients with Hypertension. *J Adv Nurs*. 2012;**68**(6):1402–13. doi: [10.1111/j.1365-2648.2011.05835.x](https://doi.org/10.1111/j.1365-2648.2011.05835.x). [PubMed: [21954893](https://pubmed.ncbi.nlm.nih.gov/21954893/)].
23. He W, Bonner A, Anderson D. Patient reported adherence to hypertension treatment: A revalidation study. *Eur J Cardiovasc Nurs*. 2016;**15**(2):150–6. doi: [10.1177/14745151155603902](https://doi.org/10.1177/14745151155603902). [PubMed: [26307159](https://pubmed.ncbi.nlm.nih.gov/26307159/)].
24. Son YJ, Won MH. Depression and medication adherence among older Korean patients with hypertension: Mediating role of self-efficacy. *Int J Nurs Pract*. 2017;**23**(3). doi: [10.1111/ijn.12525](https://doi.org/10.1111/ijn.12525). [PubMed: [28194846](https://pubmed.ncbi.nlm.nih.gov/28194846/)].
25. Ma C, Chen S, Zhou Y, Huang C. Treatment adherence of Chinese patients with hypertension: A longitudinal study. *Appl Nurs Res*. 2013;**26**(4):225–31. doi: [10.1016/j.apnr.2013.08.002](https://doi.org/10.1016/j.apnr.2013.08.002). [PubMed: [24050917](https://pubmed.ncbi.nlm.nih.gov/24050917/)].
26. Napolitano F, Napolitano P, Angelillo IF, Collaborative Working G. Medication adherence among patients with chronic conditions in Italy. *Eur J Public Health*. 2016;**26**(1):48–52. doi: [10.1093/eurpub/ckv147](https://doi.org/10.1093/eurpub/ckv147). [PubMed: [26268628](https://pubmed.ncbi.nlm.nih.gov/26268628/)].
27. Zhao S, Zhao H, Wang L, Du S, Qin Y. Education is critical for medication adherence in patients with coronary heart disease. *Acta Cardiol*. 2015;**70**(2):197–204. doi: [10.2143/AC.70.2.3073511](https://doi.org/10.2143/AC.70.2.3073511). [PubMed: [26148380](https://pubmed.ncbi.nlm.nih.gov/26148380/)].
28. Sweileh WM, Zyoud SH, Abu Nab'a RJ, Deleq MI, Enaia MI, Nassar SM, et al. Influence of patients' disease knowledge and beliefs about medicines on medication adherence: Findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine. *BMC Public Health*. 2014;**14**:94. doi: [10.1186/1471-2458-14-94](https://doi.org/10.1186/1471-2458-14-94). [PubMed: [24479638](https://pubmed.ncbi.nlm.nih.gov/24479638/)] [PubMed Central: [PMC3909379](https://pubmed.ncbi.nlm.nih.gov/PMC3909379/)].
29. Grant RW, O'Leary KM, Weilburg JB, Singer DE, Meigs JB. Impact of concurrent medication use on statin adherence and refill persistence. *Arch Intern Med*. 2004;**164**(21):2343–8. doi: [10.1001/archinte.164.21.2343](https://doi.org/10.1001/archinte.164.21.2343). [PubMed: [15557413](https://pubmed.ncbi.nlm.nih.gov/15557413/)].