

Determinants of Patient's Adherence to Hypertension Medications: Application of Health Belief Model Among Rural Patients

Kamran A, Sadeghieh Ahari S¹, Biria M², Malepour A², Heydari H³

Department of Public Health, School of Health, Ardabil University of Medical Sciences, ¹Department of Community Medicine, School of Medicine, Ardabil University of Medical Sciences, ²Department of Community Medicine, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran, ³Department of Community Health, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

Address for correspondence:

Dr. Heshmatollah Heydari,
Department of Community Health,
School of Nursing and Midwifery,
Tehran University of Medical
Sciences, Tehran, Iran.
E-mail: heshmatolahh@yahoo.com

Abstract

Background: Hypertension is a major health problem in developing and developed countries, and its increasing epidemic is a serious warning to take more attention to this silent disease. **Aim:** This study was aimed to determine the factors of adherence to hypertension medication based on health belief model (HBM). **Subjects and Methods:** A cross-sectional study was conducted in a rural area of the Ardabil city in 2013. This study was carried out using a pre-structured and validated questionnaire. The questionnaire included information on demographic characteristics, lifestyle habits, HBM constructs and adherence to hypertension medication (Morisky 4-Item Self-Report Measure of Medication-taking Behavior [Morisky Medication Adherence Scale]). Data were analyzed with the use of SPSS version 18. $P < 0.05$ was considered as statistically significant. **Results:** A total of 671 hypertensive patients participated in the study (169 were males and 502 were females). The prevalence of adherence was 24% (161/671)% in the study population. Respondents with regular physical activity and nonsmokers were more adherent to hypertension medication when compared to respondents with sedentary lifestyle and smoking ($P < 0.01$). Based on HBM constructs, the respondents who perceived high susceptibility, severity, benefit had better adherence compared to moderate and low susceptibility, severity, and benefit. **Conclusion:** The prevalence of adherence to hypertension management was low in study population, this due to inadequate perceived susceptibility, perceived severity, perceived benefit and poor lifestyle factors. Improving adherence in hypertension patients need to recognize the value and importance of patient perceptions medications.

Keywords: Adherence, Health belief model, Hypertension, Medication, Rural, Self-efficacy

Introduction

Hypertension is a major health problem in developing and developed countries, and its increasing epidemic is a serious warning to take more attention to this silent disease.^[1] In different studies, the prevalence of hypertension has been reported from 10% to 17% in Mediterranean and

Middle Eastern countries. Furthermore, the rapid rates of social and economic changes in these countries have led to greater risks of cardiovascular diseases including.^[2] In general, 25-35% of middle-aged people are hypertensive in Iran.^[3] Hypertension is important due to its pervasiveness; however, what adds to its importance is that this disease is not controlled.^[4]

Medication is common and recent approach to hypertension control and blood pressure lowering drugs are the most common drugs that are prescribed by physicians.^[1] Despite the availability of over than a hundred different drug that their effectiveness has proven in the treatment of hypertension, the reported rates of blood pressure control are very disappointing.^[5]

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Uncontrolled hypertension is caused by non-adherence to the antihypertensive drugs, patients understanding their drug regimens help to improve their adherence, thus will help prevent the complications of hypertension that are debilitating and if not prevented can increase the burden of a disease that is already on the increase.^[6]

It is generally believed that, anti-hypertensive medications are effective in reducing high blood pressure and have been shown to significantly reduce the risk of cardiovascular illness.^[7] It is further thought that patient's benefits to antihypertensive medication can be reduced because of low adherence,^[8] whereas non-adherence can be unintentional (such as forgetting) or can be intentional, whereby patients make a decision not to take treatment based on their personal beliefs about their illness and treatment.^[9]

Adherence or orders and information compliance are influenced by patient's beliefs and their health conditions.^[10] Some studies have shown negative attitudes of hypertensive patients toward their disease. These perceptions may also be important in patient compliance and performance improvement.^[11] However, if the patient thinks that hypertension is a controllable disease, following the recommendations may be more likely.^[12]

Little has been documented on the cause of poor compliance; therefore, this study was conducted to investigate influencing factors on medication adherence with using health belief model (HBM) as a conceptual framework. The use of a conceptual framework to guide this research and the interpretation of results can help us to understand the relative importance of different factors, and how they interact, in turn, helping us to design effective interventions. A major feature of this model holds that the patients have choices and are able to make suitable decisions regarding their health. This model suggests that whether or not individuals take action to protect their health depends on whether they believe that they are susceptible to an ill health condition; that the occurrence of that condition would have serious consequences; and that they have a course of action to avoid the condition and benefits of taking the action outweigh the costs. The components of this model are perceived as severity, susceptibility, threatened, benefits, and barriers.^[13]

Poor treatment adherence is a roadblock to better quality-of-life. However, little is known about the perceptions and barriers to the hypertensive medication adherence in rural communities. Hence, this study was aimed to determine the factors of adherence to hypertension medication based on HBM.

Subjects and Methods

This was a cross-sectional study, was conducted among 671 hypertensive patients who referred to rural health care centers in Ardabil city-Iran in 2013. Ardabil city is located in northwest of Iran, near Iran-Azerbaijan border. Two-stage

random sampling method was used to achieve our total sample. Out of 13 health centers available in the rural area, 6 were selected during the first stage randomly; then in the second stage, participants from each center were chosen randomly from patients' record. Participation in this study was voluntary, and details about the aim and objectives of the study was explained to the participants. Written informed consent was taken, and the participants were free to withdraw from the research at any stage without incurring any consequences. This study was approved by Institutional Review Board of Ardabil University of Medical Sciences No: 920925.

The data were collected over a period of 2 (May–June) months by interview method. All of the study participants were interviewed by rural care providers (Behvarz) using a structured questionnaire in the local Turkish language. For standardization of the data collection, all the rural care providers were trained by the first investigator prior to initiation of the study. The questionnaire was pretested and modified accordingly.

The questionnaires during the interview were comprised of six categories. The study domains included were patient's adherence, socio-demographic factors, subjective health status, lifestyle factors (meal habits, smoking, salt intake >5 g, oil consumption of <500 ml/month physical activity), medication-related variables (number and frequency of medication), HBM constructs (perceived susceptibility [7 items], severity [6 items], benefit [6 items], barriers [6 items], and self-efficacy [6 items]). The patient's adherence to medications was assessed using the Morisky 4-Item Self-Report MEASURE of Medication-taking Behavior [Morisky Medication Adherence Scale-4], which included: (a) Do you ever forget to take your medicine? (b) Are you careless about taking your medication at times? (c) When you feel better sometimes do you stop taking your medication? (d) Sometimes if you feel worse while taking medication do you stop taking it? Adherence Definition: Any respondent with history of hypertension for more than 6 months, who failed to fulfill any one of the 4 criteria in Morisky scale is said to be nonadherent.

Health belief model Questionnaire was designed based on literature review and face validity was approved by five experts in the field of health education in expert Panel. Content Validity was approved with the content validity ratio and content validity index. The questionnaire was pilot tested using 10 hypertensive patients by the researcher to find out unclear or ambiguous questions. Ambiguous questions were reworked or removed. The pilot testing of the questionnaire helped to estimate the time that could be taken to respond to the questionnaire that was on average of 15 min. Patients involved in the pilot were not included in the main study then alpha Cronbakh calculated for revised questionnaire in 30 other hypertensive patients and reliability for perceived susceptibility, severity, benefit, barriers and self-efficacy sections was 0.89, 0.82, 0.88, 0.91, and 0.92 respectively.

Data were analyzed with the use of SPSS version 18.0 for Windows (SPSS Inc., Chicago, IL, USA). The demographic characteristics of the participants were reported by using descriptive statistics (frequencies, proportions, and means). The Chi-square test was used to determine if noncompliant patients differed significantly from compliant patients. Logistic regression was used to estimate odds ratios expressing the association of selected variables with compliance. $P \leq 0.05$ was considered to be statistically.

Results

Adherence was found to be higher in age groups 30-39 years (26.9%, 58/218) and above 60 years (27%, 27/100) when compared to other age groups. Adherence was slightly high among female (24.5%, 123/502) respondents than male respondents (22.5%, 38/169). Similarly, the married respondents (24.7%, 134/543) have more adherences to hypertensive medication compared with unmarried (21.1%, 27/128), but these differences were not significant [Table 1].

The respondents exhibited poor adherence with lifestyle factors like unrestricted meal habits ($P < 0.001$, odds ratio [OR] =4.8, 95% confidence interval [CI] =3.0–7.5), smoking ($P < 0.01$, OR = 1.9, 95% CI = 1.3–2.9) and salt intake >5 g ($P < 0.001$, OR = 19.7, 95% CI = 12.2–31.7). Our study also found the following factors to be protective for adherence-oil consumption of <500 ml/month ($P = 0.06$, OR = 1.3, 95% CI = 0.9–1.9), those who perceived themselves as healthy ($P < 0.001$, OR = 13.9, 95% CI = 8.8–22) and those who did regular physical exercise ($P < 0.001$, OR = 82.8, 95% CI = 11.4–599.9) [Table 2].

Adherence was significantly higher among respondents taking only one medication 145 (90%), once daily 130 (80.7%) compared to individuals taking four types of medication 35 (21.7%) and as frequent as three or more times a day 33 (20.4%). Thus, adherence increased with a decrease in number and frequency of medication.

Study population who perceived high susceptibility (100/180, 55.6%) have good adherence compared to those who's perceived moderate susceptibility (54/190, 28.4%) and low susceptibility (7/301, 2.3%). Respondent who perceived high severity (88/157, 56%) showed better adherence than those perceived moderate severity and low severity. Respondent who perceived low benefit have 19.9 times more prone for nonadherence compared with those who perceived high benefits. Respondents with high self-efficacy (88/262, 33.6%) had significantly higher adherence than those with moderate and low self-efficacy. Those who perceived barriers to be high (22/184, 12%) had lower adherence than those perceiving moderate (24/190, 12.6%) and low barriers (115/297, 38.7%) [Table 3].

Table 1: Association between adherence and sociodemographic variables

| Variables | Nonadherence n (%) | Adherence n (%) | Total n (%) | P |
|----------------|-----------------------|--------------------|----------------|------|
| Age (years) | | | | 0.36 |
| 30-39 | 158 (73.1) | 58 (26.9) | 216 (100.0) | |
| 40-49 | 152 (80) | 38 (20) | 190 (100.0) | |
| 50-59 | 127 (77) | 38 (23) | 165 (100.0) | |
| >60 | 73 (73) | 27 (27) | 100 (100.0) | |
| Sex | | | | 0.59 |
| Male | 131 (77.5) | 38 (22.5) | 169 (100.0) | |
| Female | 379 (75.3) | 123 (24.5) | 502 (100.0) | |
| Marital status | | | | 0.39 |
| Single | 101 (78.9) | 27 (21.1) | 128 (100) | |
| Married | 409 (75.3) | 134 (24.7) | 543 (100) | |
| Total | 510 (76) | 161 (24) | 671 (100) | |

As per the Morisky scale, out of the 671 respondents, 51.6% forget taking medicines regularly, 59.8% were careless about taking their medications, 53.6% stop medication on feeling better and 55.2% stop on feeling worse.

Discussion

Blood pressure control in hypertension patients considered as a long-standing challenge. Earlier studies showed that $<25\%$ of patients who were treated for hypertension achieved the target blood pressure.^[14] Non-adherence to medications is widely recognized as a major public health concern and contributes to patient morbidity, mortality and healthcare costs.^[15]

Adherence to medication is always a matter of concern, especially in chronic diseases and identification of the factors affecting adherence since it will help to improve the treatment outcomes. The overall adherence to medication in our study was 24% as compared to a similar study, the adherence was 48.7%^[16] and in an Iranian study by Hadi. Thirty-nine point 6% of the patients were compliant (compliance score >0.9). More than 90% of the patients had good access to their drugs. The author concludes "it is possible that the prevalence of good compliance has been overestimated in our study, due to a non-random sample of patients."^[17] This variation may be due to the difference in socio demographic profile of two countries. In our study, adherence was found to be higher among people above 60 years of age and 30-39 years, with females being more compliant than the males. Similarly in an Iranian study by Hadi (2004) older patients were more compliant^[17] and in a study from Iraq, the compliance was highest among patients aged 70 years and more (78%) followed by those <30 -year-old (64%), and females were significantly more compliant than males.^[9] Another study carried out in Pakistan among 460 hypertensive's, showed that adherence increases with age and highest mean adherence rate was in the age group of 70-80 years.^[18]

Table 2: Association between adherence and lifestyle factors

| Variables | Nonadherent (n=510) | Adherence (n=161) | Total (n=671) | P | Odds ratio | 95% confidence interval |
|-------------------------|---------------------|-------------------|---------------|--------|------------|-------------------------|
| Health status perceived | | | | | | |
| Healthy | 134 (50.0) | 134 (50.0) | 268 (100) | <0.001 | 13.9 | 8.8-22.0 |
| Not healthy | 376 (93.3) | 27 (6.7) | 403 (100) | | | |
| Meal habits | | | | | | |
| Unrestricted | 251 (90.3) | 27 (9.7) | 278 (100) | <0.001 | 4.8 | 3.0-7.5 |
| Restricted | 259 (65.9) | 134 (34.1) | 393 (100) | | | |
| Exercise | | | | | | |
| Yes | 83 (34) | 161 (66) | 244 (100) | <0.001 | 82.8 | 11.4-599.9 |
| No | 427 (100) | 0 (0) | 427 (100) | | | |
| Smoking | | | | | | |
| Yes | 194 (83.6) | 38 (16.4) | 232 (100) | <0.01 | 1.98 | 1.3-2.9 |
| No | 316 (72) | 123 (28) | 309 (100) | | | |
| Amount of salt (g) | | | | | | |
| >5 | 470 (90.4) | 50 (9.6) | 520 (100) | <0.001 | 19.7 | 12.2-31.7 |
| <5 | 40 (26.5) | 84 (73.5) | 151 (100) | | | |
| Amount of oil (ml) | | | | | | |
| <500 | 227 (72.8) | 85 (27.2) | 312 (100) | 0.06 | 1.3 | 0.9-1.9 |
| >500 | 283 (78.8) | 76 (21.2) | 359 (100) | | | |

Table 3: Association between adherence and health belief model

| Variables | Non adherence (n=510) n (%) | Adherence (n=161) n (%) | Total (n=671) | Odds ratio | P | 95% confidence interval |
|--------------------------|-----------------------------|-------------------------|---------------|------------|--------|-------------------------|
| Perceived susceptibility | | | | | | |
| High | 80 (44.4) | 100 (55.6) | 180 (100) | Reference | <0.01 | |
| Moderate | 136 (71.6) | 54 (28.4) | 190 (100) | 3.1 | | 2.0-4.8 |
| Low | 294 (97.7) | 7 (2.3) | 301 (100) | 52.5 | | 23.4-117.4 |
| Perceived severity | | | | | | |
| High | 69 (44.0) | 88 (56.0) | 157 (100) | Reference | <0.001 | |
| Moderate | 125 (65.4) | 66 (34.6) | 191 (100) | 2.4 | | 1.5-3.7 |
| Low | 316 (97.8) | 7 (2.2) | 323 (100) | 57.5 | | 25.5-129.7 |
| Perceived benefit | | | | | | |
| High | 92 (52.3) | 84 (47.7) | 176 (100) | Reference | <0.01 | |
| Moderate | 200 (74.9) | 67 (25.1) | 267 (100) | 2.7 | | 1.8-4 |
| Low | 218 (95.6) | 10 (4.4) | 228 (100) | 19.9 | | 9.8-40 |
| Perceived barrier | | | | | | |
| High | 162 (88) | 22 (12) | 184 (100) | 4.6 | <0.001 | 2.8-7.6 |
| Moderate | 166 (87.4) | 24 (12.6) | 190 (100) | 1.0 | | 0.5-1.9 |
| Low | 182 (61.3) | 115 (38.7) | 297 (100) | Reference | | |
| Self-efficacy | | | | | | |
| High | 174 (66.4) | 88 (33.6) | 262 (100) | Reference | <0.001 | |
| Moderate | 235 (76.5) | 72 (23.5) | 307 (100) | 1.6 | | 1.1-2.3 |
| Low | 101 (99) | 1 (1) | 102 (100) | 51 | | 7-372 |

In our study, there was no association between sex, marital status with patient's medication adherence and this finding is consistent with similar Iranian study^[17] but in study by Joho female were more compliant compared with male it was statistical significance and female patients have found by some researchers to be better compliance to treatment.^[19,20]

In a cross-sectional study, 65.1% of 1114 patients had good adherence to antihypertensive agents and younger age and poor self-perceived health status were negatively associated with drug adherence^[21] and a similar results were obtained in the

study by Ramli.^[22] Similarly, our study also showed that the adherence was not good in younger age group. Thus, our study found that the prevalence of adherence in our population was very low because of perceived susceptibility and severity was low among our study population. This may be due to poor literacy and low socioeconomic status in rural peoples.

Monotherapy and once daily medication had a positive role in adherence compared to poly therapy and more than once a day. Similarly in a study from Brazil among 231 hypertensive, 36.2% of patients on mono therapy and 36.6% of patients taking

two drugs had controlled blood pressure only 5.9% of patients using three or more antihypertensive drugs had the same outcome.^[23] In the present study, more than half of the study respondents have forgot to take medicines regularly, stopped medication on feeling better and have a neglected attitude about taking medication. Whereas in a cross-sectional study in Iraq, 34.9% had ever forgotten to take medicines, 37% were neglectful about their medications, 37.1% skipped medicine because of feeling well and 25.7% of patients experienced bad feelings about their medication.^[9] These variations might be due to low awareness and lack of motivation among the hypertensive respondent in current study population.

Even though, a systemic review showed that life style factors were minimal role in adherence,^[24] however our study found there were signification influence on life style factors like physical activity, low oil and salt consumption, have positive effect for adherence but smoking and alcohol consumption had negative effect on adherence. This variation might be due to the fact that most of the systematic review article study was carried in urban setting whereas our study was carried out in rural setting. Our study also found that (based on HBM), those respondents who perceived high (susceptibility, severity, benefit, and cue to action) have higher adherence compared to others, similarly a systemic review also showed that inadequate knowledge about Cardio vascular disease impaired the adherence to medicine intake.^[24]

Attitudes have a key role in treatment adherence among hypertensive patients.^[17] Results of the present study showed a relationship between HBM constructs and treatment compliance; the constructs that were significantly showing relationship were perceived susceptibility, perceived benefit of using the medicine and perceived barrier to treatment. The perceived severity to hypertension did not show a significant relationship with treatment compliance that is consistent with the study by Joho.^[25] The present result corresponds closely to those of a previous study^[26] which revealed perceived barrier was important predictor to antihypertensive drugs and study done by George (2007) which perceived barrier was the strongest predictor of non-compliance to treatment^[27] and in Iranian study, having a positive attitude toward antihypertensive drugs was independent predictors of compliance.^[17] "Positive beliefs regarding medications are also crucial for shaping adherence behavior of elderly hypertensive individuals. Threatening views of illness and stronger beliefs of the necessity of medications contribute substantially to positive medication adherence."^[28]

Limitations

There were several limitations. First, this study was conducted in a rural community and did not include patients who attended urban health centers. Therefore, results cannot be generalized to urban area hypertensive patients. However, the results have important insights for same rural area within the same characteristics. Second, some possible determinants

of adherence were not investigated in this study such as the use of alcohol, education, social status. Self-reporting of treatment compliance could introduce recall bias by either over reporting or under-reporting depending on patient's behavior on the recent past. However, the researcher was clarifying the questions when asking participants. The study was quantitative descriptive cross-sectional design conducted using questionnaires which consisting of closed-ended questions that the subjects answered research questions to achieve the research purpose and aim; thus, the researcher explained clearly the questions to participants for deeper understanding.

Conclusions

This study concludes the prevalence of adherence to hypertension management was low in study population, this due to inadequate perceived susceptibility, perceived, severity, perceived benefit and poor lifestyle factor like smoking habits. All these study could be avoided by improving literacy and accessibility. Interventions aimed at building adherence in elderly hypertension patients need to recognize the value and importance of patient perceptions of illness and medications in shaping adherence behavior.

Recommendations

Patients need information to be able to understand the importance of using their medication as prescribed. It is recommended that hypertensive patients should be counseled every time whenever they visit to physician to improve the compliance to antihypertensive drugs and other needed self-cares to control hypertension and this requires health providers to orient themselves toward patients' behaviors that may interfere with compliance with therapy, in order to achieve control of hypertension in the community. It is also recommended that health education should be provided to improve the rate of compliance by improving patient's knowledge and perceptions about hypertension and its consequences.

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