The role of Health Literacy in Hypertension Control: a cross-sectional study in Iran

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Key words: Hypertension, Health Literacy, Iran
Parole chiave: Ipertensione, Alfabetizzazione sanitaria, Iran

Abstract

Background. Health literacy is peoples’ capacity to receive, process, and utilize basic health information which is necessary for proper decisions.

Objective. Assessing the Health Literacy level on controlling systolic and diastolic hypertension is the main goal of this study.

Study design. A cross-sectional study.

Methods. In this cross-sectional study, multistage cluster sampling was used to recruit 210 people affected by hypertension in Tabriz City, Iran. The data collection tool was a Health Literacy questionnaire. Among the Health Literacy dimension, such as the ability to access health information, reading health information, understanding health information, appraisal of health information, and decision making the SEM model has been utilized as a mediator variable in order to verify these variables on controlling the size of blood pressure to address the specific aims of study based on the Health Litercy.

Results. Significant correlations were found between all Health Literacy dimensions and systolic hypertension (p < 0.05). Also, the ability to access health information was the statistically significant predictor of decision making (R=0.335; p-value=0.012) and of systolic hypertension (R=-0.275; p-value=0.025). None of the Health Literacy dimensions revealed significant correlations with diastolic hypertension (p < 0.05).

Conclusions. Adequate Health Literacy is a helpful factor to control hypertension in hypertensive patients. Therefore, improving Health Literacy, especially, facilitating the patients’ access to health information, should be considered as an important factor of hypertension management.

Introduction

Hypertension is a major health problem worldwide that has been identified as the leading global risk factor for mortality and the third leading global risk factor for disease burden (1). The worldwide prevalence in 2000 of hypertension among adults aged 20 years and older was approximately 26.4%. This is an estimated 972 million people, with 333 million of them in economically developed countries and 639 million of them
in economically developing countries. The number of adults with hypertension was estimated to increase by 60% to a total of 1.56 billion in 2025. Most of this rise can be attributed to an expected increase in the number of people with hypertension in economically developing countries (2).

According to the health survey (2011), 48% of people in Bangladesh were affected by hypertension (4). Similarly, based on studies conducted in Iran (2015) among 50,000 participants aged 15 to 64, the prevalence of hypertension was 26.6% (1). Currently, in spite of effective treatments, only 37% of patients manage to maintain their blood pressure in levels recommended by health care practitioners (5).

Patients with uncontrolled blood pressure are 50% more likely to experience a cardiovascular event, like stroke, kidney failure, myocardial infarction, and death, compared to patients with controlled blood pressure (6). There is a vital need for developing high blood pressure management strategies. Healthy lifestyle is recommended by the World Health Organization (WHO) to prevent and control high blood pressure (7). Lifestyle modifications, such as increasing physical activity and dietary modifications, are of confirmed efficacy in lowering hypertension in unmedicated patients with hypertension (8) and are often suggested as the first step for controlling high blood pressure (9).

One of the most important strategies to improve healthy lifestyles is to increase knowledge and promoting Health Literacy (HL) among people (10). HL is defined as “ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course” (11). WHO refers to HL as a key element of health and recommends that countries create a multi-stakeholder ‘Council on Health Literacy’, at arm’s length from government, to monitor and assess progress, facilitate partnerships between organizations, and provide strategic direction for health literacy (12). Studies indicated that lower HL is associated with poorer health outcomes and unhealthy behaviors (13, 14). Also, HL is an effective factor in controlling blood pressure (15), understanding blood pressure measurements, risk factors and complications, necessary lifestyle changes, and aims of treatment (16). The findings of a meta-analysis demonstrated that optimal self-care in hypertensive patients could decrease systolic and diastolic blood pressure by 5 and 4.3 mmHg, respectively (17). It seems that those who are more eager to health-related information take responsibilities and make decisions about their own and their families’ health (18). Also, according to the decision-making dimension, there is a direct relationship between one’s health knowledge and her/his health-oriented attitude, so that those who participated in treatment decision-making were more able to establish successful contact with physicians (19).

This study was conducted to examine the HL and its association with blood pressure among people affected by hypertension. Identifying hypertension influential factors in such studies may be helpful in designing interventional efforts aiming at hypertension control.

Material

Participants and sampling

This was a cross-sectional study, which was conducted in October-December 2017 among subjects suffering from hypertension in Tabriz, East Azerbaijan province, Iran. In the study we employed a multistage cluster sampling to recruit 210 people. Among the initially thirteen health centers, we randomly selected five centers from which the subjects were randomly selected based on their records in such centers. According
to the Iranian health system, the health informations of all inhabitants are stored in the health center. Therefore, the subjects were randomly selected on the basis of their health records present in the health center in order to be invited to participate in the study. The participants signed a written informed consent form when present in the health center. The respondents, then, completed the questionnaires in a consultation room. Also, the interview method was applied to gather data from the respondents by the first and second researchers. The interviews lasted 15 min. The inclusion criteria for this study were limited to patients with hypertension as well as living in suburban areas while the only exclusion criterion was participants’ unwillingness to take part in the survey. Ethical approval to conduct the study was obtained from the Ethics Committee of Medical Sciences in Tabriz University.

**Instruments**

In order to collect data, the researchers used two questionnaires; one was a self-administered questionnaire to collect demographic data including age, gender, marital status, job status (employee, unemployed, housekeeper, retired), education status (illiterate, elementary, intermediate, high school, diploma, associate degree, bachelor).

The second questionnaire was a reliable HL questionnaire, which was used to assess HL (20). The questionnaire was developed by Montazeri et al. for use among Iranian adults (20). The questionnaire was assessed on the basis of the three following criteria: I) **Qualitative content validity:** In this approach, the questionnaire was delivered to 15 specialists in different fields of health including health service management, community medicine, mother and child health, mental health, health education, general medicine, public health etc. Correspondingly, their adjusted comments were included in the final questionnaire after approval of an expert team. II) **Qualitative formal validity:** In this step, the questionnaire was surveyed by 19 citizens in a face to face meeting and their remarks were examined by the team and possibly included in the final version. III) **Construct validity:** For this purpose, the questionnaire was delivered to 336 individuals while using the KMO and Kovelit Bartlett board test. IV) **Reliability:** In order to assess each instrument’s reliability, the rates of correlation among questions in each dimension were through examined using Cronbach Alpha Coefficient. For measuring the homogeneity of the intra-instrument, Cronbach Alpha Coefficient was estimated for each dimension as well as for the whole questionnaire.

The HL instrument was composed of six domains as follow: 1) **Reading health information** “constituted of four-item scale (α=0.722) which was developed to assess health issues pertaining to participants’ reading abilities. An example of this domain was: “reading health education materials (booklet, pamphlet, and educational brochures) was easy for me”. 2) **Understanding health information**, scale comprising 7 questions (α=0.869) such as “I can acquire the required health and medical information from different sources”; 3) **Appraisal of health information** was measured by using a four-item scale (α=0.777). For instance, “I can get information about healthy nutrition”. 4) **Ability to access health information** was evaluated through a six-item scale (α=0.869) such as “I can obtain information about my illness”; 5) **Decision making** was a 12-item scale (α=0.890) which was developed to measure the ability to decide health-related behaviors. Examples of items were “I avoid doing things or taking materials that might increase my weight” or “I do not stop taking medications without my doctor’s permission”, even if the symptoms of the disease had disappeared.
The items for “Reading health information” and “Ability to access health information” were rated on a 5-point Likert-type scale ranging from 1 to 5 (1 = completely difficult through 5 = completely easy). Also, for the “Appraisal of health information”, “Understanding health information” and “Decision making”, the items were rated on a 5-point Likert-type scale ranging from 1 to 5 (1 = never, 2 = seldom, 3 = sometimes, 4 = most of times, 5 = always). The higher the score, the more HL was present.

Definition of Hypertension
Hypertension was described as a systolic blood pressure equivalent to or over 140 mmHg, or a diastolic blood pressure equivalent to or over 90 mmHg, or being under medication for hypertension. Blood pressure measurement was carried out twice on each arm while participants were in sitting position and after five minutes of seated rest. The two measurements were performed with an interval of a few minutes. Accordingly, the average of the second blood pressure measurements on each arm were computed and recorded (21).

Data analysis
The Structure Equation Modeling (SEM) was used to determine HL aspects in surveillance of hypertension, which included the ability to access health information, reading health information, understanding health information, appraisal of health information, and decision making as HL dimensions. Expressly, a total effect model was fitted on the HL to show the relationship among constructs, adjusting for control variables. Assessing the fitness of model in results evaluation was carried out by linking two variables through obtained indicators covariance and by adding the covariance in modification indices. After reassurance of significant direct correlation between two independent and dependent variables, Bootstrapping methods were used. Bootstrapping is utilized to estimate the relationship between independent and intermediate variables, and independent and outcome altogether to analyze the intermediate variable.

Results
The mean age at which the people began to suffered from high blood pressure was 56.70 years old (SD = ±11.18). Participation’s age range was 31-84 years. The median of systolic hypertension was 146.37 mmHg (SD = ±20.82), and the median of diastolic hypertension was 90.02 mmHg (SD = ±14.47). There was not any statistically significant difference between average systolic blood pressure (p-value= 0.691) and diastolic blood pressure (p-value= 0.205). Forty-eight percent of participants were housekeepers while 22.9% were employees. Demographic characteristics of participants are shown in Table 1.

Table 1 - Demographic Characteristics of the study participant

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subgroups</th>
<th>N. (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Males</td>
<td>97 (46.2)</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>113 (53.8)</td>
</tr>
<tr>
<td></td>
<td>Illiterate</td>
<td>47 (22.4)</td>
</tr>
<tr>
<td></td>
<td>Elementary</td>
<td>51 (24.3)</td>
</tr>
<tr>
<td></td>
<td>Intermediate</td>
<td>37 (17.6)</td>
</tr>
<tr>
<td>Educational level</td>
<td>High-school</td>
<td>3 (1.4)</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
<td>49 (23.3)</td>
</tr>
<tr>
<td></td>
<td>Associate degree</td>
<td>10 (4.8)</td>
</tr>
<tr>
<td></td>
<td>Bachelor</td>
<td>13 (6.2)</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>48 (22.9)</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>16 (7.6)</td>
</tr>
<tr>
<td>Profession</td>
<td>Housekeeper</td>
<td>101 (48.1)</td>
</tr>
<tr>
<td></td>
<td>Retired</td>
<td>45 (21.4)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>199 (94.8)</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>11 (5.2)</td>
</tr>
</tbody>
</table>
Table 2 indicates bivariate correlations for HL dimensions and controlling systolic hypertension. According to the Pearson correlation coefficient test, it was found that systolic hypertension had a statistically significant negative correlation with all HL dimensions.

Going to Figure 1, based on SEM results, none of the HL dimensions revealed a significant correlation with diastolic hypertension (p-value >0.05). Further, the goodness of fit model beside the standard coefficients was estimated in the final Model as (CMIN/DF= 1.76, RMSEA= 0.928, CFI= 0.928, GFI= 0.828). The squared multiple correlation (R²) for diastolic blood pressure was 0.054; in other words, 5.4% of diastolic hypertension variance was explained by the model. With respect to this point, the total effect or direct effect model definition is that of independent variables on the dependent variable without the presence of a mediator variable were assessed, and in the total effect model the diastolic blood pressure predictors were not meaningful (p-value >0.05), also in the definition of the indirect effect model: the direct relationship between independent and dependent variables, firstly,
is omitted, and merely examined the indirect relationship through the mediator in the model, because the total effect model was not meaningful, we didn’t assess the indirect effect model.

Going to Figure 2, according to SEM results, among five dimensions, only the ability to access health information showed a statistically significant association with systolic hypertension in the total effect model ($R=-0.275$; $p$-value=0.025). Moreover, the goodness of fit of the model was calculated in the final model (GFI= 0.831, CFI= 0.920, RMSEA= 0.063, CMIN/DF= 1.83). As well as, the ability to access health information had direct effects on decision-making ($R=0.335$; $p$-value=0.012). The squared multiple correlations ($R^2$) for decision-making (i.e. mediator variable) and systolic blood pressure (i.e. dependent variable) were 0.219 and 0.073, respectively. This means that 21.9% of the decision-making variance and 7.3% of the variance of systolic blood pressure are explained by the model. In the final model, after examining the mediating variable i.e. decision-making and using the indirect model, again the ability to access health information dimension had a direct association with decreasing systolic hypertension ($p$-value= 0.030) (Table 3).

**Discussion**

According to the findings of previous studies, HL has a direct effect on health-related factors (22) and patients with low HL understand less about their medical conditions and overall report worse health status (23). A similar study in this regard showed that HL is related to health promoting behaviors and health-related beliefs such as adopting or avoiding breast cancer screening behavior (24). Furthermore, in stratification analysis by intervention allocation, patients with low HL showed in physician intervention
groups, a significantly lower participatory decision-making scores than adequately literate patients (5).

In the current study, the average HL scores were 81.01, which were seen to be higher than those in previous studies conducted on hypertension in Iran (25, 26). However, more than three-quarters of the participants showed partial or inadequate HL. Sørensen et al. in Europe displayed that at least one in ten (12%) respondents had insufficient HL and approximately one in two (47%) limited (insufficient or problematic) HL (23). Also, another study revealed that inadequate HL is more common among older adults in poorer health (5). These studies could indicate that HL requires a growing attention. Therefore, to improve HL level, simplifying health information as well as relation conditions is necessary to raise comprehension and participatory behaviors, especially in patients.

Based on the findings of the present study, there were significant negative correlations between all of the HL dimensions and the systolic hypertension (27). Powers et al. demonstrated that systolic blood pressure for patients with finite literacy was 1.2 mmHg lower than for patients with competent literacy in the Veterans affairs health-care system in USA, but 6.1 mmHg higher than patients with fair literacy in the university healthcare system (28). That is, the normalization of hypertension in college educated groups was better and, also, illiterates had less control over their hypertension as compared to the literate ones (29). These findings highlighted that skills related to HL should be considered as important parameters to improve self-caring in people affected by hypertension.

This study indicates that the ability to access health information explained 27.5% and 33.5% of the variance for systolic hypertension and decision making, respectively. Sørensen et al. also, reported that the ability to access information is an important element to promote, maintain and improve health in a variety of settings across the life course (30). In addition, Palumbo et al. recommended that to enhance the appropriate access to care and to improve the sustainability of the health care system, health-related literacy in patients should be promoted (31). These findings showed that health care organizations and health care providers should help patients in obtaining the health care service.

The average of HL in the reading and appraisal of health-related information dimensions was low in comparison with other aspects, and the highest score pertained to decision-making. Based on Larky et al. findings in Bushehr province, Iran, a significant association between perceived severity of their situation and adherence to both low-salt diet (OR = 3.47) and nonsmoking behavior (OR = 1.10) was

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Total effect (p-value)</th>
<th>Mediator</th>
<th>Indirect effect (p-value)</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading health information</td>
<td>-3.97 ns</td>
<td>-3.36 ns</td>
<td>-0.987 ns</td>
<td>No effect</td>
</tr>
<tr>
<td>Ability to access health information</td>
<td>-5.87 (0.025)</td>
<td>-4.72 ns</td>
<td>-1.89 (0.030)</td>
<td>Direct effect</td>
</tr>
<tr>
<td>Understanding health information</td>
<td>8.13 ns</td>
<td>8.15 ns</td>
<td>-0.052 ns</td>
<td>No effect</td>
</tr>
<tr>
<td>Appraisal of health information</td>
<td>1.61 ns</td>
<td>1.29 ns</td>
<td>0.543 ns</td>
<td>No effect</td>
</tr>
</tbody>
</table>

*significant at 95% significance level
Dependent variable = Systolic Hypertension
Intermediate variable = Decision-making
ns = Not Significant
observed. Individuals with more perceived severity (OR = 1.82) had significantly greater adherence to their medication regimens. (32). Sistani et al. observed that health care providers or physicians were the most important source of information regarding patients’ health (33). The people who have low HL do not understand medical abbreviations, and they are more at risks as far as medical errors and side effects of drugs are concerned (34). In Yilmaz and Çetinkaya’s study in Turkey, 93.2% of people could read and complete certain forms in healthcare organizations. Patients’ behaviors including treatment follow up, diet, and weight maintenance strategies were effective on hypertension control (16). Hypertension control was meaningfully lower among younger than middle-aged individuals and older adults, and hispanic vs. white population (35). Using multimedia-based approaches, such as adapting related pictures, videos and computer appeal have been proven effective (36).

Understanding health information is the process through which the reader has interaction with written materials. In fact, text understanding is a way by which the reader gets in touch and interacts with the written language and extracts the informations (37). Decision-making had the lowest average among the HL factors, and showed an inadequate level among the participants (36). Decision-making dimension requires abilities such as self-awareness, interpersonal communication, critical thinking, and problem-solving. That is, these factors are influenced by various factors such as the personality of the subject, the environment, the informations, the rewards and the punishments, proper comprehension of situation, values, and beliefs (38). Thus, the decision-making, in addition to be influenced by internal factors, is influenced also by external factors, on which the person does not have control or has only little control.

Conclusion

The findings of the present study indicate that improving health literacy, especially the access to health information, should be considered a critical part of the management of hypertension. To do this, sufficient education should be provided, and accessibility to different HL improving sources, such as counseling, booklets, and educational posters, should be made available and accessible in all health centers. Activities to improve HL may be effective to increase the awareness of patients and their control of hypertension. Thus, identifying patients with poor HL and providing simple education for them is a must for health providers.

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Author Contribution: TB and HJ: designed the study, conducted the study, gave administrative support, did drafting and revision of the manuscript. SB and FA: contributed to the study concept and design, the interpretation of the data and the drafting the manuscript. SGh and GD: designed the study, gathered the data, gave administrative support, did drafting and revision of the manuscript. All authors contributed to the study concept and design, reviewed and revised the manuscript and approved the final manuscript as submitted.

Riassunto

Il ruolo dell’alfabetizzazione sanitaria nella gestione dell’ipertensione: uno studio trasversale in Iran

Premessa. L’alfabetizzazione sanitaria è la capacità delle persone di acquisire, elaborare ed utilizzare le principali informazioni sanitarie necessarie per guidare la presa di decisioni corrette.
**Obiettivo.** Lo scopo principale di questo lavoro è stato di determinare il livello di alfabetizzazione sanitaria necessario per mettere sotto controllo l’ipertensione sistolica e diastolica

**Disegno dello studio.** Trasversale, di prevalenza.

**Metodi.** In questo studio trasversale è stato usato un campionamento a cluster multistadio per reclutare nella città di Tabriz, Iran, 201 soggetti con ipertensione. Lo strumento per la raccolta delle informazioni è stato un questionario sull’alfabetizzazione sanitaria. Nei confronti degli aspetti dell’alfabetizzazione sanitaria (la capacità di accedere alle informazioni, di leggere le informazioni, di interpretare correttamente le informazioni sanitarie e di prendere le conseguenti decisioni), il modulo SEM è stato utilizzato come una variabile di mediazione per verificare l’effetto delle dette variabili sul controllo dell’entità della pressione arteriosa.

**Risultati.** Correlazioni significative inverse sono state ritrovate tra tutti gli aspetti della Alfabetizzazione Sanitaria e la pressione sistolica (p<0.05). Inoltre la capacità di accedere all’informazione sanitaria è risultata il predittore statisticamente significativo della presa di decisioni (R=0.335; p = 0.012) e della ipertensione sistolica (R=-0.275; p=0.025). Nessuna delle dimensioni dell’Alfabetizzazione Sanitaria ha rivelato correlazioni statisticamente significative con la ipertensione diastolica (p<0.05).

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