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ORIGINAL ARTICLE

Validity and reliability of the Turkish version of the Hill–Bone compliance to high blood pressure therapy scale for use in primary health care settings

MELEK KARADEMIR¹, ISMAIL HAKAN KOSEOGLU², KEYSER VATANSEVER³ & MARJAN VAN DEN AKKER⁴

¹Hatay 2 Public Health Center, Izmir, Turkey, ²Karsiyaka1 Public Health Center, Izmir, Turkey, ³Ege University, Department of Medical Education, Izmir, Turkey, ⁴School for Public Health and Primary Care (CAPHRI), Department of General Practice, Maastricht University, The Netherlands

Abstract

Objectives: To assess the validity and reliability of the Turkish version of the Hill–Bone compliance to high blood pressure therapy scale for use in primary care in Turkey. **Methods:** To develop a Turkish version of the scale, it was translated into Turkish then back-translated into English. The final version was used in a survey in two urban primary health care centers in Izmir, Turkey. For assessing the validity of Turkish scale, we performed factor analysis to test construct validity. Reliability was assessed by calculating the Cronbach's alpha as a measure of internal consistency. **Results:** Factor analysis revealed a three-factor structure representing unintentional medication non-adherence; intentional medication non-adherence; and salt intake adherence. Percentages of explained variance were 33.3%, 14.6% and 11.2% respectively. When forcing a two-factor structure we found salt intake and medication adherence clusters. Cronbach's alpha was 0.72 and 0.83 for medication adherence and whole scale, respectively.

Conclusion: The Turkish Hill–Bone scale presented a factor structure consistent with the original scale, had a high level of internal consistency. It can be used for assessing hypertension patients' compliance in Turkish primary care settings.

Key words: Primary health care, patient compliance, hypertension, Hill–Bone Scale

Introduction

Hypertension is one of the most frequent causes of cardiovascular, cerebrovascular and renal diseases or other end organ damage worldwide. The prevalence of hypertension varies around the world, with the lowest reported prevalence in rural India (3.4% in men and 6.8% in women) and the highest reported prevalence in Poland (68.9% in men and 72.5% in women) (1). The prevalence of hypertension in Turkey is estimated at 31.8% (27.5% in men and 36.1% in women) (2).

According to the World Health Organization (WHO), at least 50% of patients diagnosed as hypertensive do not take their antihypertensive medication as prescribed (3). Approximately 75% of patients with a diagnosis of hypertension do not achieve optimal blood-pressure control (3). In the Turkish population 31% of hypertension patients

take antihypertensive medication and of these 21% have achieved optimal blood-pressure control (2). In comparison to statistical data coming from the WHO, we can observe that the Turkish population is in worse condition regarding optimal blood pressure control than the general world population.

One of the reasons for lack of control in hypertension is the low rate of patient adherence to medication. A variety of reasons for lack of adherence include patients' demographics, adverse effects of medication, high cost, having to take multiple doses per day and lack of access to health insurance or providers (4).

In medication compliance studies various methods are used including biological measures (drug assays, pill counts) and treatment outcomes, which are costly and impractical for usual primary care practice. Physician estimates and patient reports are much more

practical (5). Different medication compliance scales are published to be used in outpatient settings.

One of these scales is the Hill–Bone compliance to high blood pressure therapy scale (HBTS) which contains three main parts; (1) medication compliance; (2) appointment; and (3) salt intake items each graded according to a four point Likert scale (5,7). Morisky et al. developed a four item medication scale for hypertension which had questions focused on forgetting, failing or skipping taking pill (6). In contrast to Morisky's scale, the HBTS measures patient compliance behaviors in more details and was designed as a simple method for health care professionals in various settings to assess patient-reported compliance levels (5,7).

In Turkey, there is neither a follow-up or an early diagnosis system for chronic diseases such as hypertension. However, the compliance to hypertension treatment and control are important public health problems in Turkey that have not been studied before. Cultural, religious and traditional differences may affect the level and the reasons for non-compliance. To assess the level of compliance to hypertension treatment in the Turkish community there is a need for valid, reliable and efficient measures.

The aim of our research is to assess the validity and reliability of the Turkish version of the HBTS for future use in the field of primary care in Turkey.

Material and method

Study design

For assessing its validity and reliability, the final version of the Turkish HBTS was used in a survey in the urban area of two walk-in primary health centers (PHC) in Izmir city, Turkey. The PHCs were representatives of the two main districts north and south in Izmir city. The PHCs also showed similar socio-demographic features of Izmir city. The survey population consisted of diagnosed hypertension patients under pharmaceutical treatment for more than six months. Convenience sampling was used and the first two known hypertension patients visiting the practice of the researchers for any reason, on every working shift between the beginning of December 2006 to the end of February 2007 were included in this study. The only exclusion criterion was pregnancy.

To develop a Turkish version of HBTS, the scale was translated from English to Turkish by a medical doctor and was back translated by another medical doctor and cross checked by the translators. None of the items of the Turkish version needed cultural adaptation. The Turkish scale was piloted in 30 patients from the target population in the first week of November 2006. The target population

reported no language and understanding problems about the questionnaire.

The Turkish version of HBTS was used in combination with a questionnaire including (1) socio-demographic items (age, sex, job, health insurance, marital status and education); (2) reasons for non-compliance; reasons for running out of antihypertensive pills and health status. Health status items included smoking, alcohol consumption, weight, height, time past since hypertension diagnosis, duration of antihypertensive drug treatment, number of antihypertensive drugs and co-morbid diseases.

Data collection was done by the researchers (IHK, MK), subsequent to the consultation. After taking written informed consent the Turkish HBTS and accompanying questionnaire was administered. Interviews with each patient took less than 15 min.

The survey collection ended when 100 patients were interviewed for each PHC. A total of 200 questionnaires were completed. Using $\alpha=0.05$, a margin error of 7% and assuming a prevalence of 40% a sample size of 187 is needed. The study was approved by the ethical committee of the local health authority.

Statistical analysis

All statistical tests were carried out at the 0.05 level of significance. Means and standard deviations were calculated for age and body mass index (BMI). In addition, the distributions of socio-demographic features were determined. Owing to its irrelevance to Turkish health care system, the two questions asking compliance to appointments were not included in statistical analyses.

The validity of the Turkish HBTS was assessed by testing its construct validity and was explored by factor analysis using principal component analysis, with oblimin rotation, because of expected dependency between the components. Twelve items regarding medication and salt intake were included. Selecting of the number of factors was based on the eigenvalues greater than 1, and the scree plot (8).

Reliability was assessed by testing the internal consistency of the Turkish HBTS. Cronbach's alpha was calculated for the whole scale, and for salt intake and medication compliance items to assess the internal consistency.

All analyses were completed using SPSS 11.5 statistical software.

Results

Population characteristics

Our study population consisted of 200 hypertension patients. In Table I the socio-demographic and health status features of the study population are presented.

Table I. Demographic and health status characteristics of the 200 hypertension patients included in the survey *n* (%).

Sex	
Female	141 (70%)
Marital Status	
Married	140 (73%)
Never married	3 (2%)
Widow/er	45 (22%)
Divorced	6 (3%)
Age	
= <50	20 (10%)
51–60	64 (32%)
= > 61	114 (58%)
Educational status	
no education	38 (19%)
primary + middle school	110 (55%)
high school + university	52 (26%)
Health insurance	
workers	127 (64%)
officers	43 (22%)
others	30 (14%)
Smoking (current)	41 (21%)
Alcohol (current drinkers)	31 (16%)
BMI	28 ± 5 (19–42)
Time since hypertension diagnosis	
<7 years	96 (48%)
7–11 years	51 (26%)
= > 12 years	52 (26%)
Duration of hypertensive treatment	
<7 years	103 (52%)
7–11 years	46 (23%)
= > 12 years	49 (25%)
Number of antihypertensive drugs	
= <1 drug	140 (70%)
Co-morbid diseases	
Yes	84 (42%)

Construct validity

Table II shows the factor loadings after rotation. A three-factor structure was identified representing unintentional medication non-adherence; intentional medication non-adherence; and salt intake adherence. Percentages of explained variance were 33.3%, 14.6% and 11.2% respectively. When forcing a two-factor structure we found a salt intake and a medication adherence cluster. However, factor loadings for the medication adherence items were somewhat lower.

Internal consistency

Cronbach’s alpha was calculated as 0.83 for medication compliance, 0.62 for salt intake items, and 0.72 for whole scale of HBTS.

Table III presents the frequencies of the items of Turkish version of HBTS. Answers were grouped into two categories of perfect compliance (all items are answered as *never*) and imperfect compliance (some items are answered as *others*; sometimes; most of the time; or all of the time).

Discussion

Key findings

The purpose of this study was to assess the validity (construct validity) and to assess reliability (internal consistency) of HBTS for future use for hypertension patients in Turkey. Statistical analysis showed that the Turkish HBTS, especially the nine medication compliance questions, presented a consistent structure with the original HBTS, and was reliable as the alpha coefficients were quite high.

Strengths and limitations

The strengths of our study are that the setting was representative of the daily reality of primary care in Turkey and the patients were randomly selected. Data collection was done by the physicians, which gave an opportunity to assist the participants with difficult items. Thus the chance of having missing items in the questionnaire was reduced.

Interviews took less than 15 min which prevented patients’ boredom and loss of attention. During our data collection, some patients commented that administration of the questionnaire by their own physicians had a positive effect on their compliance. This suggests that proper monitoring could improve compliance. Similarly, Lambert et al. comment (9) that information gathered by this scale can be used as a basis for further interventions such as, patient education and monitoring.

On the other hand, in order to evaluate the influence of compliance on clinical outcomes, patients’ blood pressure measurement could be used as an objective tool and predictive validity of the Turkish HBTS could be assessed by comparing the HBTS results with blood pressure levels.

Comparison with other studies

Similar to our methods, construct validity and internal consistency of the original scale were evaluated on the basis of two community based samples of hypertensive patients by Kim et al. (5). Also predictive validity of the original HBTS was checked by testing whether the scale is showing consistency and expected relationships with related variables, such as blood pressure; and authors conclude that high compliance scale scores predicted significantly lower levels of blood pressure (5).

Table II. Construct validity of the Turkish HBTS. Results of principal component analysis.

	Subscale		
	Factor 1 unconscious non-adherence	Factor 2 conscious non-adherence	Factor 3 salt intake
How often do you:			
1. Forget to take your hypertension medicine?	0.813	0.405	0.214
2. Decide not to take your hypertension medicine?	0.394	0.824	0.058
3. Eat salty food?	0.067	0.079	0.782
4. Shake salt on your food before you eat it?	-0.049	0.107	0.762
5. Eat fast food?	0.183	-0.019	0.668
8. Forget to get prescriptions filled?	0.859	0.480	0.050
9. Run out of hypertension pills?	0.831	0.497	0.126
10. Skip your hypertension medicine before you go to the doctor?	0.321	0.668	0.206
11. Miss taking your hypertension pills when you feel better?	0.361	0.878	0.101
12. Miss taking your hypertension pills when you feel sick?	0.329	0.564	-0.167
13. Take someone else's hypertension pills?	0.535	0.018	-0.156
14. Miss taking your hypertension pills when you are careless?	0.733	0.460	0.190
Percentage of explained variance	33.30	14.64	11.21

In Table IV, results of several studies (5,7,9,11,12) are presented to compare our study's construct validity and internal consistency results. It can be seen that results of our study were similar to others.

The factor structure we detected for Turkish HBTS is consistent with the factor structure of the original scale. We identified a three-factor structure representing unintentional medication non-adherence; intentional medication non-adherence; and salt intake adherence, which resulted in a salt intake and a medication adherence cluster, when forcing a two-factor structure.

Conclusions

Considering the good construct validity and internal consistency of the Turkish HBTS Scale and the short

time needed for administering, use of this instrument will be beneficial for patients whose blood pressures are not in the appropriate range due to non-compliance, and will help physicians to plan and implement individualized hypertension care. If the physicians use only the medication compliance scale (9 items) of the HBTS, the required time will even be shorter.

As a matter of fact, non-compliance is affected by multi-factorial components. It is influenced by several behavioral aspects and socio-economical and demographic characteristics. The HBTS scale can be combined with items inquiring risks and potential reasons for noncompliance, as it was done in this study by adding question on the reasons for noncompliance and for running out of pills. This can help researchers to find out strategies not only for eliminating personal reasons for noncompliance but also for solving the health-system related or socio-

Table III. Distribution of answers to the Turkish version of HBTS's medication adherence questions.

	n (%)
How often do you	Never
1. Forget to take your hypertension medicine?	115 (57%)
2. Decide not to take your hypertension medicine?	135 (67%)
3. Eat salty food?	48 (24%)
4. Shake salt on your food before you eat it?	165 (83%)
5. Eat fast food?	53 (27%)
8. Forget to get prescription filled?	144 (72%)
9. Run out of hypertension pills?	124 (62%)
10. Skip your hypertension medicine before you go to the doctor?	161 (81%)
11. Miss taking your hypertension pills when you feel better?	143 (72%)
12. Miss taking your hypertension pills when you feel sick?	184 (92%)
13. Take someone else's hypertension pills?	179 (90%)
14. Miss taking your hypertension pills when you are careless?	125 (62%)
Total percent of perfect compliance ^{b**}	69%

^aOthers: sometimes, most of the time, all of the time.

^bPerfect compliance: all items are answered as 'never'.

Table IV. Comparison of our construct validity and internal consistency evidences with other studies’.

		Kim et al., 2000 (5)	Krousel-Wood et al., 2005 (7)	Lambert et al., 2006 (9)	Kim et al., 2007 (12)	Koschack et al., 2009 (11)	Our study (Karademir et al., 2009) study)
Study population		American urban outpatient setting (African American)	American urban outpatient setting (elderly Caucasian)	South African periurban Primary care setting	American urban outpatient setting (Korean community)	German urban primary care setting	Turkish urban primary care setting
Alpha coefficient	whole Scale medication items	0.84 –	0.77 0.76	0.77 0.76	0.43 0.68	0.73 –	0.72 0.83
Factor clusters detected	salt intake items medication adherence low salt intake	– + +	0.41 + +	0.41 Not assessed	0.49 + +	– + +	0.62 + +

economical problems that prevent patients to access antihypertensive drugs.

However, considering the lack of a follow-up or an early diagnosis system for chronic diseases in Turkey, further studies are needed to assess how often and by whom the hypertension patients should be followed-up.

We believe life long and patient-specific supports of the physicians, health care system, patients’ families and the social environment are essential for long term patient compliance, better control of blood-pressure, reducing complications; and end-organ damages, therefore, lowering overall health costs.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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