

Original Article

FACTORS INFLUENCING MEDICATION ADHERENCE AMONG HYPERTENSIVE PATIENTS IN A TERTIARY CARE HOSPITAL, PUNE, MAHARASHTRA

Aarti M Nagarkar¹, Swapnil A Gadhave², Ishor Sharma³, Ankita Choure³, Donald Morisky⁴

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Author's Affiliation:

¹Asst Professor; ²Ph.D. scholar; ³Student, School of Health Sciences, University of Pune, Pune; ⁴Professor, Department of Community Health Sciences, UCLA Fielding School of Public Health, California, USA

Correspondence: Dr. Aarti Nagarkar
Email: aarati@unipune.ac.in

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ABSTRACT

Background: Chronic illnesses require long term compliance to treatment for positive health outcome. Objectives of this study were (a) to translate and validate eight item Morisky Medical Adherence Scale (MMAS) and (b) to determine association between patient characteristics and medicine adherence in hypertension.

Methods: A Cross sectional study among 205 patients, attending medicine OPD in a district hospital, was conducted. Reliability and validity analysis of the translated scale was carried out. Chi square test was used to check associations.

Results: Translated scale showed fair reliability (α 0.635) and convergent validity ($r=0.859$; $p<0.01$). Medication adherence was significantly associated with age, family type and experience of symptoms. Gender, education, frequency and number of medication did not show any association.

Conclusion: The scale can be used as preliminary tool to identify non adherent patients, prior to change of treatment regimen.

Key words: Hypertension, adherence, scale, validation, India

INTRODUCTION

Worldwide, 7.6 million premature deaths are attributed to high blood pressure.¹ According to the ICMR report (2004) the weighted prevalence for hypertension, was 164.18 per 1,000 adults for urban areas, and 157.44 for rural areas.² Prevalence of hypertension is increasing exponentially in India.³ Hence hypertension has become a significant public health problem in India. High blood pressure (BP) is a major risk factor for cardio vascular disease and better control can lead to prevention of 300,000 of the 1.5 million annual deaths from cardiovascular diseases in India.³ Patient's knowledge regarding hypertension and its complications as well as their beliefs and attitudes are some of the key factors in achieving compliance to medicine and control of blood pressure.⁴ Prevention of hypertension is possible but rarely achieved.

Term compliance and concordance can be used as synonym with adherence. Adherence means extent to which patient's behaviour coincides with the medical

or health advice.⁵ Low adherence leads to reduction in treatment benefits. Symptoms of hypertension do not disturb daily routine hence compliance with medical regimen is variable. Adherence to treatment for blood pressure is influenced by number of factors and can be measured using different methods. Pill counting, drug concentration in the body fluids and response to therapy; these methods are used to measure adherence.⁶ However for an outpatient setup a feasible, reliable, and valid measure of medication adherence is required. Standardized questionnaires are widely used because of low cost and less time required to administer. Morisky and colleagues developed four item scale in 1986 to measure adherence.⁵ The scale was widely used but poor psychometric properties of the scale was one of the noticeable limitation. Therefore, Morisky and colleagues developed eight item Morisky Medication Adherence Scale (MMAS) in the year 2008. The eight item MMAS has been validated for hypertension on a sample of 1400 hypertensive patient.⁷ This scale was tested and validated to use in the out-

patient setting and translated in Asian languages like Malaya, Thai and Urdu.^{8,9,10} However studies done using translation in Indian languages are not found in the published literature. Therefore, objective of the study was to translate the eight item MMAS in regional language, Marathi and check its reliability and convergent validity among patients on the antihypertensive treatment.

MATERIALS AND METHODS

Study setting and population: This cross sectional study was carried out in a region served by the state government's civil hospital located in the urban parts of Pune District in the state of Maharashtra in the year 2012-13. The hospital provides healthcare and emergency treatment for all illnesses and has a dedicated out-patient department for medicine.

Sample size: Sample size of 209 diagnosed hypertensive patients was calculated using prevalence of 16.4%.² Four incomplete records were deleted from final analysis hence present paper is based on 205 participants. An inclusion criterion was; patients diagnosed with hypertension or on anti hypertensive treatment for more than six months, aged over 18 years and able to communicate in Marathi language. Pregnant women reporting hypertension, patients with co-morbidities or cognitive and hearing impairments were excluded. All subjects provided the written consent form before participation. Response rate was 96%. This study received approval from the ethics committee of the University of Pune. Face to face interviews were conducted using schedule with translated eight MMAS items and other demographic parameters. Kuppuswamy scale¹¹ was used to assign socio economic status to each individual. Blood pressure readings recorded on the day of the interview, however some records were deleted from the final analysis due to technical and administrative errors. Thus the final analysis for blood pressure measurement is based on the 174 patients.

Sampling technique: Sample was selected randomly from patients who were attending the out-patient department of the hospital. Every day, patients attending outpatient set up were numbered serially and selected 15 random numbers using lottery method. If a patient refuses to participate next random number from the list was selected. This procedure was repeated every day until we completed the decided sample size. Patients were recruited on six days a week in the morning and afternoon session of the outpatient department.

Translation of the scale: Two translators who were native speakers of Marathi language independently conducted forward translation of MMAS-8 scale from English to Marathi later on first and second forward translation was compiled to form a third translation. The third translation was back translated in English by one who was unaware of the source document. There were discussions among principal investigator, re-

searcher involved in project and translators to resolve discrepancies in the translation and thus final version was approved.

Statistical analysis: Internal consistency was assessed using Cronbach's alpha value. Convergent validity was checked using Pearson's correlation. Convergent validity was assessed using Pearson's correlation between MMAS scores and the scores on the four-item Morisky scale. Correlations were interpreted using following criteria; 0-0.25 = little or no correlation, 0.25-0.5 = fair correlation, 0.5-0.75 = moderate to good correlation and greater than 0.75 = very good to excellent correlation.⁸ Descriptive statistics were used to describe demographic and social characteristics of the patients and their adherence score. The Chi square (χ^2) test was employed for categorical variables. The significance level was set at p less than 0.05. Values of systolic blood pressure were not in normal distribution as Shapiro Wilk test failed to show p value greater than 0.05. Hence, based on the principle that if sample size greater than 100, skewness (0.813) and kurtosis (0.276) values ranging between -1 to 1, we used ANOVA test to compare mean values for systolic blood pressure for different medical adherence category. Socio economic status was measured using Kuppuswamy scale modified in 2010.¹¹ Kuppuswamy scale have five categories for socio economic status but for the purpose of data presentation categories were merged and three different categories have been formed. Upper lower and lower categories were merged renamed as lower category. Upper middle and lower middle categories were merged to form middle category and upper category was kept as it is. All analyses were performed using SPSS version 19.0 (SPSS Inc., Chicago, IL).

RESULTS

Reliability and validity of translated scale (MMAS-8)

The first objective of this study was to translate and validate a scale to use in the given study setting. The translated scale showed fair consistency with Cronbach's α value of 0.635. Its item to total correlation coefficient ranged from 0.122 to 0.530 as seen in Table 1. This showed the correlation of each item with Cronbach's α coefficient. Cronbach's α value did not change, even if item is deleted. This study tested convergent validity of the translated tool by comparing it with MMAS-4, which is based on the similar theoretical construct. A strong positive strength of linear relationship ($r=0.859$; $p<0.01$) between translated MMAS-8 and MMAS-4 was observed.

Sensitivity and specificity: Adherence categories did not show any significant association ($\chi^2=1.196$; $p=0.550$) with blood pressure measurement. Blood pressure was categorized as 'under control' and 'not under control' as per JNC -7 guideline.¹² Further, ANNOVA was used to calculate and compare mean values for systolic blood pressure for different categories of adherence as seen from Table 2. No significant

difference between the mean values for systolic blood pressure for different medical adherence category was noted. Sensitivity and specificity of MMAS_8 Marathi

version was found to be 21.96 % and 83.33 % respectively with positive predictive value of 80.55 % and negative predictive value of 25.36%.

Table 1: Reliability analysis of the MMAS -8 Marathi version

Questions	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Forget to take high blood pressure medicine sometime	0.225	0.647
Forget to take medicine sometime over the past two weeks.	0.487	0.553
Cut back or stop medication because medication makes condition worse.	0.412	0.594
Forget to bring along your medications when travel or leave home.	0.182	0.663
Did you take medicine yesterday?	0.122	0.645
Stop taking medication when feel blood pressure is under control.	0.345	0.607
Feel hassled about sticking to blood pressure treatment plan.	0.53	0.554
Difficulty in remembering to take blood pressure medication.	0.52	0.55

Table-2 Comparison of mean value of blood pressure for different medication adherence category

MMAS category	N	Mean (S.D.)	P value
Low adherence	35	142.4(19.744)	0.985
Middle adherence	99	142.53(17.74)	
High adherence	40	143.05(18.619)	

(p-value greater than 0.05 is non-significant)

Demographic characteristics of participants: For the purpose of further analysis lower adherence category was merged with medium and compared with high

adherence category. Score 8 on scale was categorized as 'high adherence', those who scored below 8 as 'low adherent'. Thus, 23.4 percent were high adherent and 76.5 percent showed low adherence to the medication. Table 3 illustrates that the patients with age less than 57 years (odds ratio [OR],3.348:95%CI,1.665 to 6.732) and living in nuclear family setup (OR 2.67 :95%CI,1.378 to 5.175) were more likely to have lower adherence to medication as compared to their respective counterparts; older than 57 years and staying in extended family.

Table 3: - Association between demographic characteristics across adherence level

Adherence categories	Low adherence Score<7 (%)	High adherence Score = 8 (%)	Odds Ratio (95% CI)	p-value
Age				
57 yrs and below	91(86.7)	14(13.3)	3.348 (1.665-6.732)	0.001**
Above 57 years	66(66.00)	34(34.0)		
Sex				
Male	92(81.4)	21(18.6)	1.820 (0.947-3.495)	0.097
Female	65(70.7)	29.3)		
Marital status				
Married	126(77.3)	37(22.7)	1.208 (0.554-2.634)	0.684
Divorce/widow	31(73.8)	11(26.2)		
Family type				
Nuclear	103(83.7)	20(16.3)	2.670 (1.378-5.175)	0.004**
Joint/extended	54(65.6)	28(34.1)		
Education status				
Illiterate	20(12.7)	10(33.3)	0.555 (0.240-1.285)	0.169
Literate	137(87.3)	38(21.7)		
Socio economics Status				
Lower	72(78.3)	20(21.7)	1.144 (0.592-2.208)	0.74
Upper	85(75.9)	27(24.1)		
Experience of symptoms of hypertension				
No	61(85.9)	10(14.1)	0.414 (0.192-0.892)	0.024*
Yes	96(71.6)	38(28.4)		
Frequency of medication				
Once a day	90(73.2)	33(26.8)	0.390 (0.084-1.807)	0.358
More than once a day	14(87.5)	2(12.5)		
Number of medicines for hypertension (per day)				
One	135(75.8)	43(24.2)	0.714 (0.255-1.998)	0.631
Two or more	22(81.5)	5(18.5)		

* = p-value <0.05; ** = p-value <0.01

Respondents who did not experience symptoms of hypertension (OR, 0.414:95%CI, 0.192 to 0.892) were less likely to be in the low adherent category compared to those who reported experiencing such symptoms. Other variables like gender, marital status, education, socioeconomic status, number and frequency of medication did not show any significant association with adherence to medication.

DISCUSSION

This study is first of its kind to translate and check reliability and convergent validity of the eight item MMAS in the hypertension patients in India. Reliability value is less than that of original study (which records 0.83), but consistent with the Malaysian⁸ (alpha 0.675) and Thai⁹ (alpha 0.612) versions. In this study MMAS-8 is used with the intention to screen patients with different degree of medicine adherence. Present study showed higher specificity and lower sensitivity compared to the studies carried out in Pakistan.¹⁰ However, high specificity (83.33%) and high positive predictive value (80.55%) are encouraging. There is a higher probability of having high adherence among those having blood pressure value within recommended limit. But results did not show any positive association between blood pressure and medication adherence categories. There are two possible explanations; firstly the blood pressure values of the patients visiting study setting were recorded after they came out of clinician's cabin. It was observed that blood pressure values were missing /not recorded on some of the case papers. As a result nearly 15 percent were not included in the sensitivity analysis. Secondly, information on variables which were outside the purview of this study; life events, stress, co morbidity, duration of illness would have helped us to explain these result. Other researchers from India may consider exploring these factors in their research.

Table 3 describes some of the important clues for practice with regard to age, symptoms experience and family type of the patients. Symptom burden has been identified as one of the predictors of the medication adherence in studies among hypertensive patients.^{13,14} Although, in our study, odd ratio is less than 1 and difficult to draw definite conclusion, it is suggestive that the patients who are in the high adherence category are less likely to experience symptoms. Additionally, family type and age of the respondent found to be significantly associated with the medication adherence. Lower age associated with lower adherence was reported in a study carried out by the Duke University in the USA.¹⁵ However with regard to family type, a study carried out in southern parts of India reports association of nuclear family with good adherence to medication.¹⁶ Results of the south India study are opposite to what we observed in our study. Further investigation on the role of family and support received from the family members may prove helpful in interpreting and comparing these results.

Studies from patient's perspective have brought out several reasons for poor adherence like prescribing complex regimens, failing to explain the benefits, side effects of a medication, cost of the medications and complexity of treatment in terms of number of medicines and number of times to administer in a day.¹⁷ These factors can be studied in the future research studies. The overall awareness, treatment and adequacy of control of hypertension in our country are low. Therefore more studies are required to identify the nature of problem and plan future action.¹⁸ We would like to mention some of the limitations of our study. Test-retest reliability is not computed in this study due to the inherent limitation of the cross-sectional design. Retest reliability computation requires data collection at two different points of time; baseline and follow up after specific time interval. However, due to outpatient setting of a study setting being outpatient department of a tertiary hospital, we were not able to get necessary number of patients for follow up with the similar time interval.

CONCLUSION

Study identifies different factors associated with adherence to the medication among hypertensive patient like family support, emotional effect of illness and appearance of symptoms these factors should be consider while developing community based intervention or health education module to increase medication adherence. Factors like complexity of medication and frequency of dosages need further exploration with large sample size and qualitative inquiry to find role of these factors in adherence to medication in Indian context. Considering the strengths and weaknesses of this study, we conclude that the translated version has fair reliability, internal consistency and convergent validity hence can be used to check adherence to the medication among hypertensive patients. Marathi version of eight item MMAS scale is acceptable and applicable in any local outpatient setting.

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