

Determinants of Adherence to Antihypertensives Among Elderly: A Multifactorial Concern

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Purpose: The aim of the study was to assess the predictors of adherence among elderly on antihypertensives and to examine the difference in adherence among males and females.

Patients and Methods: Cross-sectional survey design was adopted for the study. The data were collected from 800 patients of age 60 years and above using demographic proforma, clinical proforma and Morisky Medication Adherence Scale (MMAS-8) with due approval from the institutional ethical clearance committee and written informed consent from the participants.

Results: The findings revealed no significant difference in the non-adherence rates among males and females. Number of medications was identified as the major predictor of adherence.

Conclusion: Awareness of factors influencing medication adherence is crucial for health professionals to provide appropriate advice for patients to maintain quality health. The findings of the study highlight the importance of nurses' role towards imparting knowledge on hypertension and emphasizing on the importance of adherence to antihypertensives among elderly.

Keywords: hypertension, aged, adherence, medication, gender, medication nonadherence, drug adherence, elderly, antihypertensive agents

Introduction

Hypertension (HTN) contributes significantly to the global disease burden of cardiovascular and cerebrovascular diseases.¹ It is the leading cause of death accounting for 7.1 million deaths annually, and 13% globally. Geriatric phase is a crucial stage in every individual's life that demands utmost care. The main factor for inadequate BP control among the geriatric population is poor medication adherence.^{2,3} As age advances, the risk of cardiovascular diseases (CVDs) increases among older adults. Gender plays a vital role, with women being at increased risk of CVDs.⁴

According to the data released by the Ministry of Health and Family Welfare (MOHFW) on January 6, 2020, approximately 23% of the elderly individuals (aged ≥ 60 years) exhibit multi-morbidities. CVDs prevail among 37% of the individuals aged more than 75 years, whereas HTN is reported among 28% of the individuals aged 60–64 years and 35% of those aged 70–74 years.⁵ The chronicity of condition and being placed on long-term prescription regimens; nonadherence to antihypertensive medications requires an increasing attention among elderly. In a descriptive, cross-sectional, clinical study conducted in West Bengal, India, only 44.63% of a total of 186 geriatric patients were reported to adhere to antihypertensives.⁶

According to the World Health Organization statistics (2011), 83 million people in India are aged ≥ 60 years, accounting for approximately 7% of the nation's total population. Nonadherence to medications is estimated to result in 8% of hospital admissions in this population. The reasons for nonadherence include cost of medicines, inadequate

instruction, switching over to an alternative treatment, and medication side effects. Given that both medication use and the incidence of drug-related problems increase with advancing age, ensuring appropriate intake of medicines in the elderly population holds utmost importance.⁷

Numerous studies have been conducted to assess nonadherence to medication among patients with HTN. However, in India, limited studies have assessed adherence to antihypertensives among the elderly population. Such studies in India, particularly in coastal areas of Karnataka, are over a decade old, with the most recent one conducted in Udupi district and published in 2016⁸ and another one conducted by Navaneetha.⁹ Moreover, these studies included patients aged more than 18 years and were not centered on the elderly population. The present study aimed to assess the predictors for adherence among elderly individuals on antihypertensives and examine the difference in adherence between male and female patients.

Materials and Methods

Design

A cross-sectional survey design was used to identify patients who are nonadherent to antihypertensives. The data collection was done from July 2013 to July 2015 from 800 patients aged ≥ 60 years attending the outpatient clinics of Medicine in a tertiary referral hospital in Karnataka. The hospital caters to a large number of patients from southern states of India such as Karnataka, Kerala, and Goa.

Participants

Hypertensive individuals aged ≥ 60 years capable of managing medications and able to understand English/Kannada were included from the study. Patients with chronic kidney disease, acute cerebrovascular disease, acute coronary syndrome, and major mental disorders were excluded from the study.

Data Collection

To identify patients meeting the inclusion criteria, the patients' record was reviewed. Demographic details were obtained using a demographic proforma and the clinical details were obtained from the case records.

Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8), which is a standardized scale authorized for utilization with set norms. MMAS-8 has eight items with "Yes" and "No" options. Based on the total score, individuals were categorized as having low adherence (scores from 0 to <6), medium adherence (from 6 to <8), and high adherence (score = 8).¹⁰⁻¹² Standardized Kannada version of MMAS-8 with permission from the original author was used.

Ethical Considerations

The clearance was obtained from the institutional ethical committee (IEC no. KH IEC 253/2012) of Manipal University, Manipal, and the study was conducted in accordance with the Declaration of Helsinki, with prior CTRI registration (CTRI/2017/04/008405). Before enrolling the participants in the study, written informed consent was ensured and they were briefed regarding the study objectives and provided a subject information sheet.

Data Analysis

The data obtained using MMAS-8 were coded as per the coding instructions given in the standardized scale. The final coded data of demographic proforma, clinical proforma, and the MMAS-8 scale were entered in SPSS (version 20.0) for the statistical analysis. Descriptive and inferential statistics (logistic regression and chi square test) were used to address the study objectives.

Validity, Reliability, and Rigor

The demographic proforma and clinical proforma were given to nine experts from the fields of medicine and nursing for validation. The validated tools were translated to Kannada and retranslated back to English. Both the original and the

translated English versions of the tool were given to a language expert to check for any deviation from the original due to translation. The reliability of MMAS-8 has been established ($r = 0.83$).

Results

Among 800 participants, 417 were men and 383 were women. Of the 383 female participants, 301 (78.6%) were aged ≥ 60 –70 years, 355 (92.7%) were unemployed, 255 (66.6%) were having the annual income of <12, 000–1,00,000 INR, and 352 (91.9%) were dependent on their children and spouse for treatment expenses. Of the 417 male participants, 177 (42.4%) had the educational qualification of >7th standard-Pre University Course (PUC), 397 (95.2%) were living with their spouse, 367 (88%) belonged to a nuclear family, and 283 (67.9%) had insurance facility (Table 1).

A larger proportion of the male patients 293 (70.3%) were being treated for HTN for over a year, and 279 (66.9%) had comorbidities. Of the total male patients, 323 (77.5%) were taking an average of 1–4 medications including antihypertensives daily (Table 2).

Table 1 Gender Wise Socio Demographic Characteristics of Sample in Frequency and Percentage (N=800)

Variables	Males (N=417)	Females (N=383)
	Frequency (%)	Frequency (%)
Age in years		
≥ 60 –70	296 (71)	301 (78.6)
>70	121 (29)	82 (21.4)
Education		
Illiterate	39 (9.4)	115 (30)
<7th standard	138 (33.1)	151 (39.4)
>7th standard–PUC	177 (42.4)	103 (26.9)
Degree	63 (15.1)	14 (3.7)
Occupation		
Professional	32 (7.7)	3 (0.8)
Non-professional	88 (21.1)	3 (0.8)
Business	37 (8.9)	1 (0.3)
Retired	102 (24.5)	14 (3.7)
Cooli	98 (23.5)	7 (1.8)
Not working	60 (14.4)	355 (92.7)
Living with spouse		
Yes	397 (95.2)	255 (66.6)
No	20 (4.8)	128 (33.4)
Type of family		
Nuclear	367 (88)	329 (85.9)
Joint	50 (12)	54 (14.1)
Annual income of the family		
<12,000	173 (41.5)	255 (66.6)
12,000–1 lakh	169 (40.5)	109 (28.5)
>1 lakh–2.5 lakhs	49 (11.8)	14 (3.7)
>2.5 lakhs	26 (6.2)	5 (1.3)
Health insurance facility		
Yes	283 (67.9)	239 (62.4)
No	134 (32.1)	144 (37.6)
Finance for the treatment		
Children and spouse	155 (37.2)	352 (91.9)
Own	262 (62.8)	31 (8.1)

Table 2 Gender Wise Clinical Variables of Sample in Frequency and Percentage (N=800)

Variables	Males (N=417)	Females (N=383)
	Frequency (%)	Frequency (%)
Duration of treatment		
<1 year	124 (29.7)	96 (25.1)
>1 year	293 (70.3)	287 (74.9)
Comorbidities		
Yes	279 (66.9)	234 (61.1)
No	138 (33.1)	149 (38.9)
Number of medications		
1–4	323 (77.5)	304 (79.4)
>4	94 (22.5)	79 (20.6)

Nonadherence to Antihypertensives Among Elderly and Gender Differences in Adherence

Among the patients identified as nonadherent to antihypertensives, 162 (38.8%) were men and 147 (38.4%) were women (Table 3). The difference in medication adherence between the male and female patients was determined using binary logistic regression. The result indicated that the difference in the nonadherence rate between the male and female patients was nonsignificant (crude OR: 0.980; 95% CI: 0.737–1.304) (Table 4).

Predictors of Adherence to Antihypertensives Among Elderly individuals

Univariate analysis was performed to determine the association of medication adherence with age, educational level, living with spouse, type of family, annual income of the family, insurance, duration of diagnosis, gender, comorbidities, number of medications, and finance for the treatment. The number of medications and medication adherence was found to be statistically significant ($\chi^2 = 5.114$, $p = 0.024$); however, medication adherence was not found to be associated with the other variables (Tables 5 and 6). Binary logistic regression was done to discover the effects of these variables on the probability of participants' adherence to the antihypertensive medications. The regression model proved that with an increase in the total number of prescribed medications, the adherence to antihypertensives decreases among elderly individuals (crude OR: 1.511; 95% CI: 1.055–2.163), indicating polypharmacy as a strong predictor for nonadherence. None of the other variables were found to be the statistically significant predictors for adherence to antihypertensives among elderly individuals (Tables 4 and 7).

Discussion

The findings of this study indicated that the proportions of nonadherence did not differ significantly between male and female patients. This finding is contrary to those of other studies, which have reported that the adherence rate to the

Table 3 Gender-Wise Adherence to Antihypertensives in Frequency and Percentage (N=800)

Level of Adherence	Males (N=417)	Females (N=383)
	Frequency (%)	Frequency (%)
Adherence (High adherence category (score=8))	255 (61.2)	236 (61.6)
Non-adherence (Low adherence category (scores from 0 to <6) and Medium adherence category (scores from 6 to <8))	162 (38.8)	147 (38.4)

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Table 4 Logistic Regression Analysis Showing Predictors of Adherence to Antihypertensives Among Elderly (N=800)

Variables	Crude OR	95% CI for Crude OR	
		Lower	Upper
Age in years			
≥60–70 (reference)	1	-	-
>70	1.070	0.770	1.485
Gender			
Male	0.980	0.737	1.304
Female (reference)	1	-	-
Education			
Illiterate	1.526	0.879	2.651
<7th standard	1.609	0.970	2.669
>7th standard–PUC	1.700	1.022	2.828
Degree (reference)	1	-	-
Occupation			
Professional (reference)	1	-	-
Non-professional	0.631	0.284	1.404
Business	1.450	0.544	3.867
Retired	0.808	0.371	1.760
Cooli	1.133	0.511	2.509
Not working	0.981	0.480	2.003
Living with spouse			
Yes	1.142	0.794	1.643
No (reference)	1	-	-
Type of family			
Nuclear (reference)	1	-	-
Joint	0.919	0.603	1.399
Annual income of the family			
<12,000	1.101	0.521	2.329
12,000–1 lakh	0.882	0.412	1.888
>1 lakh–2.5 lakhs	0.960	0.398	2.318
>2.5 lakhs (reference)	1	-	-

prescribed medications is higher in male patients than in female patients.^{13,14} Result of a systematic review with meta-analysis conducted on gender differences in the adherence to antihypertensive drugs also revealed that among patients aged ≥65 years, self-reported adherence was lower in women than in men.¹⁵

The present study also revealed a statistically significant association between medication adherence to antihypertensives and the number of medications. However, age, educational level, living with spouse, type of family, annual income of the family, insurance, duration of diagnosis, gender, comorbidities, and finance for the treatment were not found to be the significant predictors for adherence to antihypertensives among elderly individuals. This finding is congruent with those of studies conducted at outpatient departments of teaching hospitals in Southern India and Pune, Maharashtra, which have reported nonsignificant associations of the duration since diagnosis, comorbidities, gender, marital status, educational level, and socioeconomic status and a significant association of the number of medications with the adherence to medication. However, these studies have reported divergent observations regarding the association of medication adherence with living in a nuclear family.^{16–18} Findings of studies piloted in West Bengal, India, and Gweru, an urban area of Zimbabwe, are also inconsistent with those of the present study, which have reported the significant associations of age, educational level, monthly income, and duration of treatment with adherence to antihypertensive medications.^{6,19}

Table 5 Chi-Square Test for Exploring the Variables Associated with Adherence to Antihypertensives Among Elderly (N=800)

Variables	Adherent (=8) f (%)	Non-Adherent (<8) f (%)	χ^2 (df)	P value
Age in years				
≥60–70	364 (74.1)	233 (75.4)	0.162	0.688
>70	127 (25.9)	76 (24.6)		
Sex				
Male	255 (51.9)	162 (52.4)	0.018	0.892
Female	236 (48.1)	147 (47.6)		
Education				
Illiterate	94 (19.1)	60 (19.4)	4.414	0.220
<7th standard	180 (36.7)	109 (35.3)		
>7th standard–PUC	178 (36.3)	102 (33)		
Degree	39 (7.9)	38 (12.3)		
Occupation				
Professional	22 (4.5)	13 (4.2)	6.827	0.234
Non-professional	47 (9.6)	44 (14.2)		
Business	27 (5.5)	11 (3.6)		
Retired	67 (13.6)	49 (15.9)		
Cooli	69 (14.1)	36 (11.7)		
Not working	259 (52.7)	156 (50.5)		
Living with spouse				
Yes	404 (82.3)	248 (80.3)	0.514	0.473
No	87 (17.7)	61 (19.7)		
Type of family				
Nuclear	429 (87.4)	267 (86.4)	0.156	0.693
Joint	62 (12.6)	42 (1.6)		
Annual income of the family				
<12,000	272 (55.4)	156 (50.5)	2.013	0.570
12,000–1 lakh	162 (33)	116 (37.5)		
>1 lakh–2.5 lakhs	38 (7.7)	25 (8.1)		
>2.5 lakhs	19 (3.9)	12 (3.9)		

Consistent with the findings of the present study, the study conducted in Hong Kong and Nigeria revealed that a high number of prescribed medications was a significant predictor for nonadherence.^{19,20} Inconsistent with the present study findings, a few studies have reported that the age, educational level, income, comorbidities, co-living, and lack of private health insurance lead to a higher likelihood of patients' noncompliance to the drug treatment.^{21–26}

Limitations

This study was conducted in a hospital, where patients can be benefited by receiving health information from health profession students and better opportunity to interact with their physicians. Thus, the views expressed by respondents in this study may not reflect those of patients attending other health care settings.

The cross-sectional study design is not the best approach to investigate the predictors of the event of interest since it is affected by several biases. However, this study included only those patients with HTN who were registered at the selected tertiary care hospital. Additionally, the sample was representative of the patients with regard to the inclusion criteria considered in the study. Furthermore, cross-verification of the medications was not possible to assess medication adherence objectively.

Table 6 Chi-Square Test for Exploring the Variables Associated with Adherence to Antihypertensives Among Elderly (N=800)

Variables	Adherent (=8) f (%)	Non-Adherent (<8) f (%)	χ^2 (df)	P value
Health insurance facility				
Yes	330 (67.2)	192 (62.1)	2.153	0.142
No	161 (32.8)	117 (37.9)		
Finance for the treatment				
Children and spouse	319 (65)	188 (60.8)	3.487	0.175
Own	172 (35)	121 (39.2)		
Duration of treatment				
<1 year	128 (26.1)	92 (29.8)	1.305	0.253
>1 year	363 (73.9)	217 (70.2)		
Comorbidities				
Yes	323 (65.8)	190 (61.5)	1.521	0.217
No	168 (34.2)	119 (38.5)		
Number of medications				
1-4	372 (75.8)	255 (82.5)	5.114	0.024*
>4	119 (24.2)	54 (17.5)		

Note: *P<0.05.

Table 7 Logistic Regression Analysis Showing Predictors of Adherence to Antihypertensives Among Elderly (N=800)

Variables	Crude OR	95% CI for Crude OR	
		Lower	Upper
Health insurance facility			
Yes	1.249	0.928	1.681
No (reference)	1	–	–
Finance for the treatment			
Children and spouse (reference)	1	–	–
Own	0.838	0.624	1.124
Duration of treatment			
<1 year (reference)	1	–	–
>1 year	1.202	0.876	1.650
Comorbidities			
Yes	1.204	0.896	1.618
No (reference)	1	–	–
Number of medications			
1-4 (reference)	1	–	–
>4	1.511	1.055	2.163

Notes: All the variables tested through univariate analysis were again entered into the bivariate logistic model. For the bivariate model, the Hosmer and Lemeshow test gave a Chi-square value of 6.469 with $df=8$ ($p=0.595$) indicating good model fit. Nagelkerke R^2 was 0.024 showing that the variables included in the model predicted 2.4% of nonadherence.

Conclusion

The benefits of any medication to patients or individuals depend on the individual's adherence to the therapeutic regimen. The number of medications prescribed to elderly patients should be considered while providing care as it is one of the key determinants of medication adherence. Special attention must be paid to patients with a relatively high risk, such as older patients, those with low educational level, and individuals recently diagnosed with HTN.

Relevance to Clinical Practice

This study highlights the significance of identifying elderly individuals nonadherent to antihypertensives, which can improve quality of life of the elderly population by facilitating prevention of complications secondary to uncontrolled HTN.

Abbreviations

HTN, hypertension; CVDs, cardiovascular diseases; MMAS-8, Morisky Medication Adherence Scale-8.

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Disclosure

Donald E. Morisky holds a copyright and trademark for the Morisky Medication Adherence Scale-8, is one of its authors, and collects fees in exchange for licenses to use the scale. This does not alter the authors' commitment to objectivity in research or adherence to data sharing policies. The authors report no other conflicts of interest in this work.

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