

## Social and health system related determinants of anti hypertensive drugs adherence among the adults in Rural South India

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### Abstract

**Background:** Hypertension is the most common modifiable risk factor for cardiovascular diseases, stroke and renal failure. Poor adherence to antihypertensive medication has led to increase in uncontrolled hypertension. Various socio-demographic and health system related factors has contributed to this low adherence towards antihypertensive medication. Studying the prevalence of adherence to antihypertensive drugs and its determinants, and adopting methods to promote medication adherence will help to improve the treatment outcomes. Hence this study aims to find out the adherence to antihypertensive drugs and identify the social and health system related determinants of adherence among the adult patients in a rural population in South Kerala, India.

**Materials and Methods:** Community based cross-sectional study was carried out in the Nellanad Panchayat, in the district of Trivandrum in Kerala state in South India. 304 adult patients diagnosed with hypertension since 1 year or more were studied. Data were collected by house to house visit, using interview method. From each ward the first participant was selected randomly and consecutive houses were surveyed till 19 hypertensive patients were surveyed from each of the total 16 wards. MMAS-8 (Morisky medication adherence scale) was used to estimate adherence to antihypertensive drugs. Descriptive statistics and Pearson's Chi square test were applied. Descriptive statistics and Pearson's Chi square test were applied.

**Results:** 77.96% had good adherence to antihypertensive drugs. Occupation and socioeconomic status of the participants was found to be significantly associated with adherence to antihypertensive drugs.

**Conclusions:** Patients with the identified associated factors should be intensively monitored for drug adherence and patient-tailored and measurement-guided intervention approaches are required to prevent complications of uncontrolled hypertension.

**Key-words:** Adherence; Determinants; Adult; Antihypertensive Drugs; Kerala; South India

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### I. Introduction

Non communicable diseases (NCDs) are chronic diseases conditions which are not passed from person to person. Main types of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes.<sup>1</sup>

Hypertension is a dominant risk factor for cardiovascular diseases. In half of the patients, uncontrolled hypertension has been attributed to patients' poor adherence to drug regimen.<sup>2, 3</sup> WHO emphasized that "increasing the effectiveness of adherence interventions may have a greater impact on the health of the population than improvement in specific medical treatments".<sup>4</sup>

The aim of this study was to find out the adherence to antihypertensive drugs and identify the social and health system related determinants of adherence among the adult patients in a rural population in South Kerala.

### II. Materials and Methods

**Study design:** A Community based Cross sectional study was conducted

**Study location:** Nellanad panchayath that consists of 16 wards and is a rural area in the Trivandrum district of Kerala, a state in India

**Study duration :** January 2020 to February 2020

**Sample size** was estimated as 304,

**Sample size calculation:** It was done using the formulae  $N = Z\alpha^2pq/L^2$  where p, prevalence of adherence was obtained from a previous similar study.<sup>5</sup>

**Subjects And Selection Methods** : all Adult patients of Nellanad panchayath diagnosed with hypertension since 1 year or more were studied. There are 16 wards in the Panchayath. From each ward the first participant was selected randomly and consecutive houses were surveyed till 19 hypertensive patients were surveyed from each ward.

**Inclusion criteria:** included, who were willing to give consent for the interview

**Exclusion criteria:** Patients who were severely ill and unable to give consent or responses to the question were excluded.

**Methodology:** Data were collected by house to house visit, using interview method with a semi-structured proforma which was pretested and modified accordingly. Study variables included a) Sociodemographic variables: Age, Gender, Religion, Marital status, Education, occupation, socioeconomic status b) Medication and health care related variables: Duration of treatment, System of medicine followed, medical facility utilized, Distance of the medical facility,monthly expenditure on antihypertensive drugs and c) Adherence to antihypertensive drugs

A face to face interview of the study participants were conducted after taking an informed consent from them. Questions from Morisky 8-item self-report measure of medication-taking behaviour known as the MMAS-8 (Morisky medication adherence scale was used to estimate the level of adherence of the respondents to antihypertensive drugs.It has 8 questions related to various barriers to medication adherence. The first seven items are dichotomous response categories with yes or no questions with a score of either 1 or 0 assigned to each question accordingly and the last item is a five point Likert response with a score of 0 to 4 assigned to the 5 options and the score of the reported option is divided by 4. The total score is calculated. A total score of less than 6 was considered as low adherence, 6 to less than 8 as medium adherence and a score of 8 as high adherence.<sup>6</sup>

**Ethical considerations:** Ethics Committee Clearance has been obtained from the Institutional Ethics Committee. Informed written consent was obtained from each study participant prior to data collection.

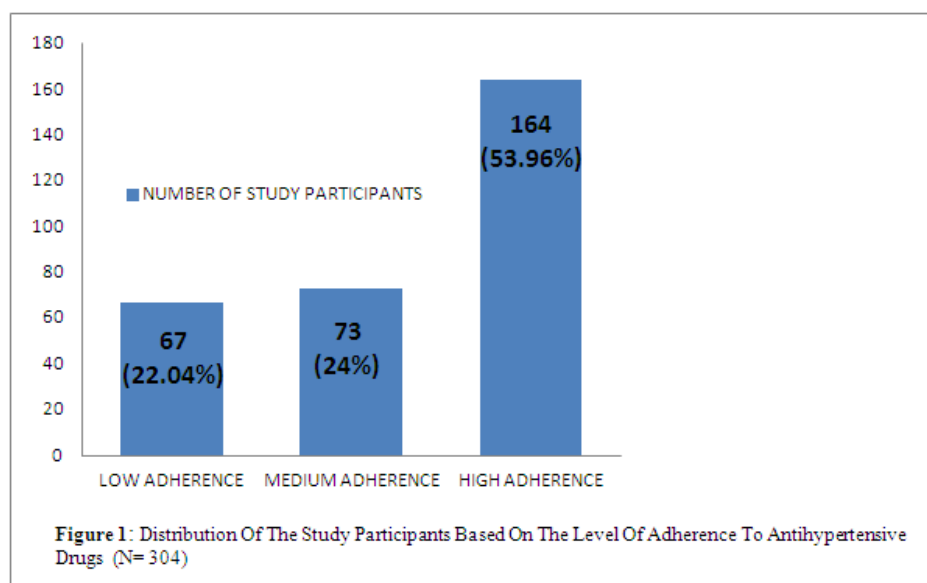
**Statistical Analysis:** Data were coded, entered and analyzed using Statistical Package for Social Science (SPSS) 20, trial version.Quantitative variables were expressed using Mean and Standard Deviation and Qualitative variables were expressed using frequency and percentages. Chi square test was done as the test of significance. P value < 0.05 was considered as statistically significant.

### III. Results:

The total study participants were 304 adults aged 27 to 87 years. Mean age of the study participants was 58.33 with standard deviation of 11.65 years. Mean age of the male study participants was 57.97 with standard deviation of 12.54 years and Mean age of the female study participants was 58.61 with standard deviation of 11.94 years.

Scoring based on MMAS-8 (Morisky Medication Adherence Scale) was used to estimate the level of adherence to antihypertensive drugs among the study participants (Figure 1)

MMAS8 Scoring criteria:Score <6 is low adherence and score of 6 to <8 is medium adherence and a score of 8 is high adherence



Thus a total of 77.96% (with confidence interval 73.3 – 82.62) participants having either high or medium adherence were considered as having good adherence and the rest 22.04% participants with low adherence were considered as having poor adherence in this study.

The distribution of participants based on socio-demographic variables were determined and then they were categorized based on the level of adherence into study participants with good adherence and poor adherence. Pearson’s Chi Square test was used as the test of significance to find out the association between socio-demographic variables and level of adherence. P value less than 0.05 was considered as statistically significant (Table 1).

**Table 1:** Association between socio demographic variables of the participants and adherence to antihypertensive drugs (N= 304)

Socio-demographic variables		Poor adherence	Good adherence
Age group	30 to 60 years	32(19.17%)	135(80.83%)
	>60 years	34(24.82%)	103(75.18%)
Chi square value	1.416	p value	0.234
Gender	females	34(19.77%)	138(80.23%)
	males	32(24.24%)	100(75.76%)
Chi square value	0.880	p value	0.348
Religion	Hindu	38(19.49%)	157(80.51%)
	Muslim	13(21.67%)	47(78.33%)
	Christian	15(30.61%)	34(69.39%)
Chi square value	2.852	p value	0.240
Marital status	living with spouse	23(29.49%)	55(70.51%)
	not living with spouse	43(19.02%)	183(80.98%)
Chi square value	3.733	p value	0.053
Education	diploma and above	6(10.34%)	52(89.66%)
	up to high school	48(24.12%)	151(75.88%)
	illiterate	12(25.53%)	35(74.47%)
Chi square value	5.492	p value	0.064
Occupation	semi profess and above	8(13.33%)	52(86.67%)
	unskilled to skilled	28(30.11%)	65(69.89%)
	unemployed	30(19.87%)	121(80.13%)
Chi square value	6.637	p value	<b>0.036</b>
Socio Economic Class	upper & upper middle	5(7.81%)	59(92.19%)
	lower middle	9(20.93%)	34(79.07%)
	upper lower	46(26.90%)	125(73.10%)
	lower	6(23.08%)	20(76.92%)
Chi square value	10.027	p value	<b>0.018</b>

It was noted that no significant association could be found between adherence to drugs and socio demographic factors like age, gender, religion, marital status and education while, association between adherence to drugs and two socio-demographic factors, occupation (p value 0.036) and socio economic status (p value 0.018) were found to be statistically significant.

Distribution of health system related variables like duration of treatment, medical facility utilized, distance of the medical facility and monthly expenditure on antihypertensive drugs among the study participants were studied and association between these factors and level of adherence were determined (Table: 2).

**Table: 2.** Association between health system related factors of the participants and adherence to antihypertensive drugs (N=304)

DURATION OF TREATMENT	POOR ADHERENCE	GOOD ADHERENCE	TOTAL
Up to 10 yrs	57(23.46%)	186(76.54%)	243 (79.93%)
11 to 20 yrs	8(14.81%)	46(85.19%)	54 (17.76%)
>20yrs	1(14.29%)	6(85.71%)	7 (2.31%)
<b>TOTAL</b>	66 (100%)	238(100%)	304(100%)
Chi – square: 2.174 and p value : 0.337			
<b>MEDICAL FACILITY UTILIZED</b>			
Public	52(24.3%)	162(75.7%)	214 (70.39 %)
Private	14(15.56%)	76(84.44%)	90 (29.61%)
<b>TOTAL</b>	66 (100%)	238(100%)	304(100%)
Chi – square: 2.850 and p value : 0.091			
<b>DISTANCE OF MEDICAL FACILITY</b>			
<5kms	48(22.75%)	163(77.25%)	211 (69.41%)
>5kms	18(19.35%)	75(80.65%)	93 (30.59%)
<b>TOTAL</b>	66 (100%)	238(100%)	304(100%)
Chi – square : 0.454 and p value : 0.500			
<b>MONTHLY EXPENDITURE ON DRUGS</b>			
Free of cost	42(23.6%)	136(76.4%)	178 (58.55%)
Purchases drugs	24(19.05%)	102(80.95%)	126 (41.45%)
<b>TOTAL</b>	66 (100%)	238(100%)	304 (100%)
Chi – square : 0.898 and p value : 0.343			

There is no significant association between health system related factors and adherence to antihypertensive drugs. But it was noted that more number of participants utilizing private medical facility (84.44%) and having out of pocket expenditure on drugs (80.95%) had good adherence to antihypertensive drugs compared to the remaining.

#### IV. Discussion

In the present community study, more than half (53.96%) of the participants reported full adherence and almost a quarter (22.04%) reported poor adherence to antihypertensive drugs. The overall good adherence was 77.96%. The finding in this study is in line with the studies conducted in Lebanon (77.6%), Canada (77.0%), and Pakistan (77.0%).<sup>7, 8, 9</sup> Prevalence of good adherence to medication in the current study was found to be higher compared to studies from Saudi Arabia (27.9%), as well as studies from North India by Bandari et al (27%), and South India by Venkatachalam et al (24.1%).<sup>10, 11, 12</sup> But in the study from Kerala by Balasubramaniam et al, the adherence rate was higher (87.3%) than that of our study.<sup>13</sup> These differences in the prevalence of adherence among various studies may be due to difference in socio-demographic characteristics and health care facilities among this study and the comparison studies. The difference in data collection technique, sample size calculation and sampling techniques may also attribute to this difference.

The limitation of this study is that, self-reported questionnaire was used to measure the medication adherence. So there were chances of response bias which may result in underestimation of non-adherence to hypertension medications.

It was found that the age group of 18 to 60 years had higher percentage (80.83%) of adherence towards antihypertensive drugs compared to the remaining study participants. These findings were supported by studies from Saudi Arabia and South India.<sup>5, 14</sup> Higher adherence rate was found among the elderly patients in two studies from Kerala and one study from Tamil Nadu.<sup>12, 13, 15</sup> It can be seen that many of the studies noted higher adherence rate in the elderly age group and this may be due to the support rendered by care takers (wife, son, daughters, and daughter-in-law) in properly adhering to the treatment.

In this study the married respondents were found to have more adherence to antihypertensive medication compared to the remaining unmarried respondents. This high adherence may be due to the spouse providing adequate support to the patient, by providing finance for the treatment or by reminding the schedule of drugs to be taken or by giving motivation to stick on to the medication.

From this study, significant association was found between occupation of the participant and adherence towards antihypertensive drugs. Similar results were noted in the study from Thiruvalla, Kerala where the adherence rate was higher among the unemployed respondents but with no significant association.<sup>15</sup>

In this study socioeconomic status had significant association with adherence. The findings are supported by the Central Kerala study where, a statistically significant association was observed between adherence and income level ( $p=0.009$ )

It was observed that in this study patients who were on treatment for hypertension for a longer duration had better adherence to drugs. Similar results were noted in the study from Kolkata.<sup>11</sup>

Even though, in this study no significant association was observed between distance to health care facility and treatment adherence, studies like the study by Venkatachalam et al, and study by Siraj Ahmad, showed that as the distance to health care facility decreased, adherence to medication improved.<sup>12, 16</sup> This shows that accessibility to health care facility is an important factor influencing treatment adherence

Poor adherence was observed more among those using public health care facility than those using private facility. A different finding was seen in the study from Tamil Nadu, where the respondents using private health care facility were found to be less adherent than those who were using public facility.<sup>12</sup> These differences may be due to the differences in regional health care facilities. For example, in some areas the private facility may be unaffordable, in some other area they might be having an efficient public health care facility, and in another region the quality of public health care facility may be very poor.

This study noted that non-adherence among patients was found to be influenced by more than one factor. The association between non adherence and factors such as occupation and socioeconomic status of participants was found to be statistically significant

Participants reported forgetfulness, high cost of medications, distance of medical facility from home and lack of family support as some of the reasons for their poor adherence

## **V. Conclusion**

Patients with the identified associated factors should receive more intensive monitoring for drug adherence. To achieve sufficient adherence, patient-tailored and measurement-guided intervention approaches are required. Promoting satisfactory adherence to anti hypertensive drugs has greater impact on the health of a population than any improvement in specific medical treatments.

Adherence is a complex phenomenon and various factors like the role of the physicians in providing information, doctor-patient relationship, and behavioral and psychological factors can affect that. And these can be investigated in more detail in the future studies More emphasis should be given on research works to strengthen the existing programme for prevention and control of NCDs

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