Medication Adherence Factors Among Hypertensives Attending Out Patient Department Of A Tertiary Care Hospital In West Bengal.

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Abstract
Background: Hypertension is the commonest cardiovascular disorder. Small reduction in blood pressure can largely reduce complications and mortality. Poor adherence reduces treatment benefits, obscures assessment of therapeutic effectiveness and costs the health care system heavily to manage resultant effects. Identification of factors affecting medication adherence can facilitate tailoring of interventions to specific patient issues.
Objectives: To find out the status of adherence to medication among known hypertensive patients attending an Out Patient Department (OPD) and its association with their socio-demographic profile, knowledge & practice regarding hypertension and its treatment.
Methodology: 52 known hypertensive patients on treatment for at least 6 months, attending the General Medicine OPD at Medical College, Kolkata, chosen by systematic random sampling. Exit interview was done with a pre-designed & pre-tested data collection form.
Results: Among 52 patients 53.85% were female and rest were male, 65.38% were in 41-60 year age group, 73.07% were Hindu, 61.54% urban residents and 61.54% belonged to lower socio-economic class. 26.92% were educated up to Primary level and 36.54% were homemaker. 61.54% had no addiction, 48.08% had developed hypertension within last 3 years. Co-morbidities were seen among 51.92%, among whom 53.84% were consuming 2-4 medicine doses daily. 78.85% participants were aware of at least one risk factor of hypertension, 65.38% knew at least one complication of the disease and 63.46% knew that anti-hypertensive medication needs to be continued lifelong, but 55.77% cases were found to have low-adherence to medication. Educational status significantly affected medication adherence (p<0.05), while other factors were not found to be statistically significantly associated.
Conclusion: Educational status was found to significantly affect medication adherence, with the less educated tending to be less adherent.
Keywords: Hypertension, Medication adherence, Kolkata.

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I. Background

Non-communicable diseases are considered a global epidemic, affecting both the developed and developing nations of the world. While the developed countries have been facing the threat of non-communicable diseases for long, in the developing countries like India as well, there has been large increase in non-communicable disease burden. More than 38 million people die due to non-communicable diseases globally each year [1]. In India, as per the World Health Organization (WHO), around 5.87 million deaths occur due to non-communicable diseases annually, which account for 60% of all deaths in India, sharing more than two-thirds of the total deaths due to non-communicable diseases in the South-East Asia Region of WHO [2]. Among Indians, 1 in 4 individuals risk from dying due to non-communicable diseases before they reach the age of 70 [3].

Cardiovascular diseases are the most common among all non-communicable disease. 45% of all non-communicable disease related deaths occur due to cardiovascular disorders [2].

Hypertension is the commonest among all cardiovascular disorders [4]. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50% of all deaths [4]. Annually, 7.6 million premature deaths worldwide are attributed to high blood pressure [5]. Prevalence of hypertension has been increasing exponentially in India [6]. The WHO also estimates that every fourth individual in India aged above 18 years has raised blood pressure and the prevalence has increased by 10% from 2010 to 2014 [2]. However, only half of the people who are hypertensive actually know that they have the disease. Amongst them, half have adequate treatment [7].

Hypertension like every other non-communicable disease, require long-term, often life-long treatment in form of drugs, changes in the life-style and dietary modifications for proper control. Therefore, proper adherence to treatment and control measures are essential to achieve required benefits. Poor adherence on the other hand not only reduces treatment benefits, but also obscures assessment of therapeutic effectiveness. Poor adherence costs the health care system a lot to manage the resultant effects. In many cases, hypertension co-exists with other non-communicable diseases, which results in the patient using poly pharmacy, which many a times affect their medication adherence.

II. Objectives

To find out the status of adherence to medication among known hypertensive patients attending General Medicine Out Patient Department (OPD) and its association with their socio-demographic profile, knowledge & practice regarding hypertension and its treatment.

III. Methodology

A descriptive epidemiological study with cross-sectional design was carried out in the General Medicine OPD of Medical College, Kolkata; conducted over 2 months from August to September 2018. Data collection was done on 2 fixed days of the week for 4 weeks during OPD hours.

Known hypertensive patients on treatment for a minimum period of 6 months who gave consent were included under the study. Patients on 1st OPD visit and/or with acute presentations were excluded from the study.

For selecting the study samples, systematic random sampling was done. As per one study, prevalence of hypertension among OPD patients was 15.5% [8]. Considering this prevalence, the sample size became 51 using the formula $n = \frac{z^2 pq}{l^2}$ where allowable error $l = 10\%$, $z = 1.96$, at 95% confidence interval.

A pre-designed and pre-tested data collection form with questions related to socio-demographic profile, knowledge & practice regarding hypertension and its treatment were used. A part of the data collection form also included questions based on the Morisky Medication Awareness Scale 8 (MMAS-8) validated in India by a study [9]. MMAS-8 has 8 items. Response choices are "Yes" or "No" for items 1 through 7 and Item 8 has a five-point Likert response scale. Each "No" response is rated as 1 and each "yes" response is rated as 0 except for item 5, in which "Yes" is rated as 1 and "No" is rated as 0. For Item 8, the code (0-4) has to be standardized by dividing the result by 4 to calculate the summated score. Total scores on the MMAS-8 range from 0 to 8.

Face validity of the data collection form was established with the help of senior experts of Public Health and General Medicine. The data collection form was translated into vernacular and was back translated to check concordance. Content and construct validity was checked by appropriate statistical tests and also reliability of the tool was established from a pilot study carried among 10 participants who were excluded from the main study.

Exit interview was conducted with the help of the vernacular version of the tool by the investigator on the selected patients and each interview needed about 30 minutes.

Collected data was compiled and analyzed with the help of Microsoft$^©$ Excel 2016 and SPSS$^©$ software package version 11. Variables for socio-demographic factors and knowledge & practice regarding hypertension and its treatment (dichotomized as per definitions below) were tested for any relationship with the status of adherence that was determined by MMAS-8.

Operational definitions used for analyzing data are given below:

High level of medication adherence	A score of 8 as per MMAS-8.
Low level of medication adherence	A score of ≤ 7 as per MMAS-8.
Area of residence: Urban	Patients with area of residence in Corporation or Municipality areas.
Area of residence: Rural	Patients with area of residence in Panchayat areas.
Higher Socio-economic Status	Classes I, II and III as per the Modified B. G. Prasad scale [10, 11] for socio-economic status.
Lower Socio-economic Status	Classes IV and V as per the Modified B. G. Prasad scale [10, 11] for socio-economic status.
Occupation: Home based	Homemakers and retired patients who stay at home.
Occupation: Others	Patients who work out of their home to earn their livelihood.
One medicine dose per day	Patients consuming only one medicine dose per day for hypertension and not having any other co-morbidity that require medication.
More than one medicine dose per day	Patients consuming more than one medicine dose per day for hypertension and other morbidities, when applicable.

IV. Results

The study was conducted on 52 subjects, of whom 53.85% were females and 46.15% were males. Among the study subjects, 32.69% belonged to the age group of 41-50 and 51-60 years each, with the mean age being 53.04 years, the standard deviation being 10.103, with the minimum age being 36 years and the maximum being 75 years. Of all participants, 61.54% were urban residents and the rest were from rural areas (38.46%). Majority were Hindus (73.07%), the rest being Muslims (26.93%), 90.38% of the participants were presently married; 3.84% were widowed and the rest were unmarried (5.77%). Most of the study subjects were educated up to primary level (26.92%) followed by those who had studied up to Secondary level (25.00%). 36.54% were homemakers and most of the participants belonged to family of size less or equal to 4 (63.46%). Most of the subjects (38.46%) had a monthly per capita income between Rs. 948-1896 (Class-IV, according to B.G. Prasad scale modified on Sept. 2016) [Table 1]. Among those who had addiction to substance (38.46% of all participants), tobacco use was most frequent in them (75.00%); use of alcohol was found in 10.00%, while 15.00% had used both tobacco products and alcohol.

A large number of study subjects (48.08%) had developed hypertension within the last 3 years, followed by 34.61% having developed the disease in the period beyond 3 years up to 7 years; 17.31% had developed hypertension over 7 years back. Among those who had co-morbidities that required medication (51.92%), acid peptic disease (51.85%) followed by diabetes (44.44%) were the most common co-morbidities [Figure 1]. Majority of the subjects (53.84%) were consuming between 2-4 medicine doses per day for hypertension and other co-morbidities when applicable, followed by those consuming 1 medicine dose per day and more than 4 medicine doses per day (23.08% each).

In regard to existing knowledge regarding hypertension, 67.31% of the respondents gave correct answer that hypertension is not caused by germs, however, only 34.62% could correctly say that hypertension is a familial disease. Among study subjects 78.85% were aware of at least one pre-disposing factor of hypertension. Among them 'stress' followed respectively by 'raised blood sugar', 'obesity' and 'lack of physical exercise' were the most commonly pointed out risk factor(s) of hypertension [Figure 2]. 65.38% of all the participants were aware about at least one complication that can occur in untreated and partially treated cases of hypertension. In an order of decreasing frequency, 'brain stroke', 'heart attack', 'bleeding per nose', 'kidney problem' and 'eye problem' were the complication(s) pointed out by them [Figure 3]. Among all the study subjects, when asked about continuation of anti-hypertensive medications, 63.46% correctly said that medications were to be continued lifelong. All the study subjects (100.00%) could say that if a dose is missed on one day, no extra dose needs to be taken the next day, while taking the requisite medicine dose for that day. 88.46% of the respondents said that they did not take extra salt in food apart from that used while cooking, while 7.69% took extra salt and 3.85% did not take any salt in food at all.

As per score obtained using MMAS-8, 55.77% study subjects were found to be having low adherence to medication [Table 2]. The most common reason(s) pointed out by them behind their low adherence were 'monetary problem' (79.31%) to buy necessary medicines, followed by 'lack of time' (62.07%), 'feeling unwell after taking medicines' (37.93%) and 'no one to remind about taking medicines' (3.45%) respectively on multiple response basis.

In this study, significant association (p<0.05) was observed between educational status and medication adherence. The less educated tended to be less adherent to medication. No statistically significant association was found between medication adherence and other factors [Table 3].

Since the study was hospital based, only those patients who attended the General Medicine OPD of Medical College, Kolkata could be included. Large section of patients who attend other hospitals or private clinics therefore could not be studied. Another limitation was, since this study was conducted using recall method, recall bias could have affected the outcome of the study.

V. Discussion

The present study found high medication adherence among 44.23% study subjects and low adherence among the rest (55.77%). In another study done by Nagarkar et al. in Pune in 2012-13 [9], high medication adherence was found among 23.4% of the study subjects.

A similar study done in 2014 in Guntur, Andhra Pradesh [12] found 15.3% of the participants to be adherent to medication. A study by Venkatachalam et al [13] found that 24.1% of the participants were adherent. Vasam et al. in their study [14] showed 72.15% of the subjects to be less adherent to medications.

In Ethiopia [15] and Malaysia [16], similar studies found adherence to be 64.6% and 48.7% respectively among study participants.

In the study by Nagarkar et al. [9] referred above, low medication adherence was found to be commoner in younger study subjects (86.7%) than older ones (66%), which was statistically significant (p<0.01). The study by Hema and Padmalatha [12] also arrived to similar result where younger subjects (65.5%) showed more low adherence compared to older subjects (53.4%), and this was statistically significant as well (p<0.05). However,

in this study, though low medication adherence was found to be more common in the younger study subjects (59.46%) than the older study subjects (46.67%), it was not found to be significantly affecting medication adherence.

In the present study, 54.17% males and 57.14% females were found to have low adherence to medication. The study by Venkatachalam et al. [13] showed 77.4% males and 74.5% females had low adherence, while Nagarkar et al. [9] found 81.4% male subjects and 70.7% female subjects to be having low medication adherence. Though the three studies found no statistically significant association between medication adherence and sex, Hema and Premlatha [12] in their study found medication adherence was significantly low (p<0.05) among males (74.5%) than females (48.4%).

In the present study, 66.67% and 40.91% of the study subjects belonging to lower and higher socio-economic status respectively were found to have low medication adherence. In the study done in Pune [9], 78.3% subjects belonging to lower socio-economic status and 75.9% subjects belonging to higher socio-economic status had low medication adherence. The study in Guntur, Andhra Pradesh [12] however showed that prevalence of low medication adherence was more in participants from higher socio-economic status (66.4%) than those from lower socio-economic status (59.6%). The findings were not statistically significant.

The present study found statistically significant association (p<0.05) between educational status and status of medication adherence, with the less educated tending to be less adherent to medication (68.97%) than the more educated (39.13%). In the study done in Guntur, Andhra Pradesh [12], 73.6% of the less educated and 55.8% of the more educated were found to have low medication adherence, which was statistically significant as well (p<0.05). Nagarkar et al. [9] found 12.7% of the less educated and 87.3% of the more educated were having low medication adherence, but the association was not significant.

In the present study, it was found that 66.67% study subjects taking 1 medicine per day had low medication adherence, and 52.50% of those having more than 1 medicine per day were found to have low medication adherence, but there was no statistically significant association. However, low medication adherence was found among 73.2% study subjects taking 1 medicine dose a day and among 87.5% study subjects taking more than 1 medicine doses a day in the study by Nagarkar et al. [9] with no statistically significant association. Hema and Padmalatha [12] in their study found that those who took more than one medicine dose a day had poorer adherence (75%) than those having to take a single medicine dose a day (54%); and the association was statistically significant (p<0.05).

VI. Conclusion

Educational status was found to be significantly affecting adherence to medication, with the less educated tending to be less adherent to their medication. Associations of adherence with other considered factors were not found to be statistically significant.

CONFLICT OF INTEREST: None.
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VII.   Tables And Figures
Table 1: Distribution of study subjects according to socio-demographic characteristics.
(n=52)

Socio-demographic characteristics	Category/Group	Frequency (Percentage)
Age (years)	≤ 40	6 (11.54)
	41-50	17 (32.69)
	51-60	17 (32.69)
	61-70	9 (17.31)
	>70	3 (5.77)
Educational Qualification	Illiterate	5 (9.62)
	Just literate	6 (11.54)
	Primary	14 (26.92)
	Middle	4 (7.69)
	Secondary	13 (25.00)
	Higher secondary or above	10 (19.23)
Socio-economic status	I	1 (1.92)
	II	9 (17.31)
	III	10 (19.23)
	IV	20 (38.46)
	V	12 (23.08)
Occupation	Homemaker	19 (36.54)
	Business	8 (15.38)
	Housemaid	5 (9.62)
	Driver	5 (9.62)
	Retired	4 (7.68)

	Factory Worker	3 (5.77)
	Farmer	3 (5.77)
	Teacher	2 (3.85)
	Book binder	2 (3.85)
	Proof reader	1 (1.92)

Figure 1: Distribution of study subjects according to co-morbidities requiring medication. (n=27)
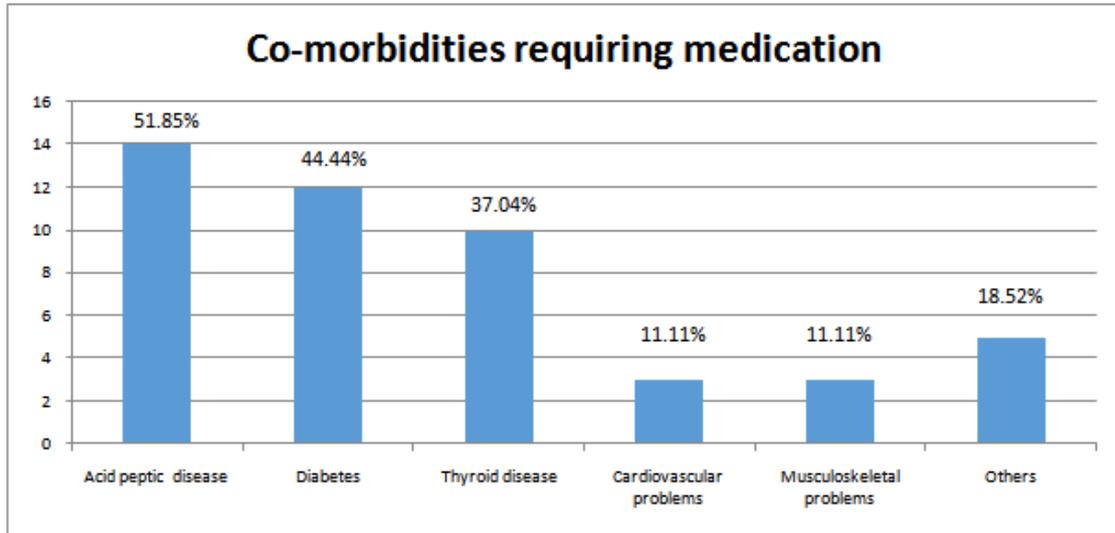
(Multiple response)

Figure 2: Distribution of study subjects according to the pre-disposing factors they pointed out for hypertension.   (n=41)
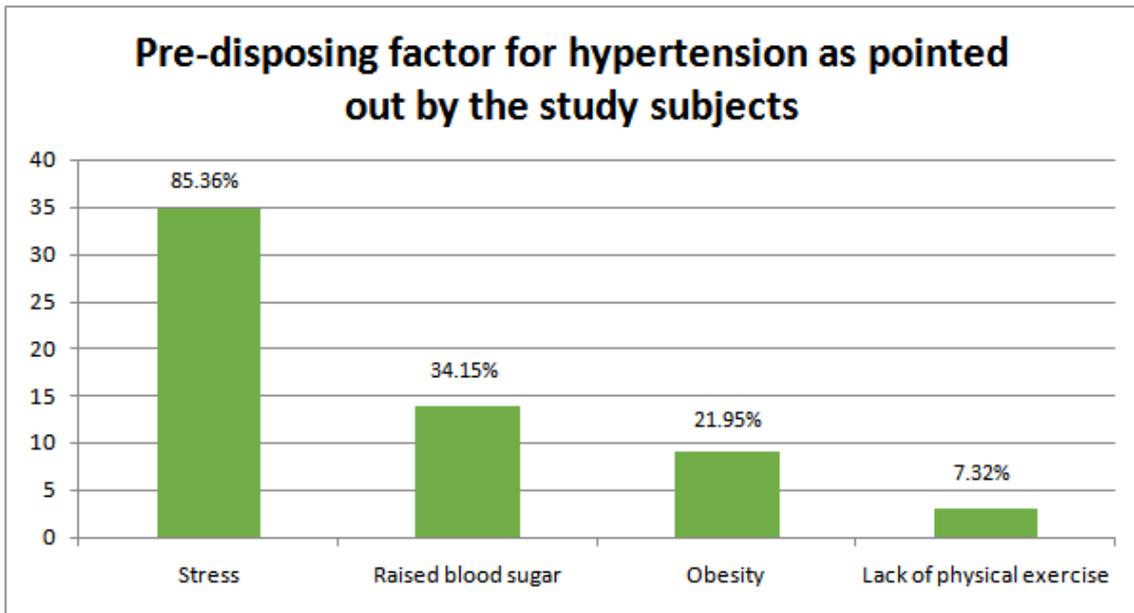

(Multiple response)

Figure 3: Distribution of study subjects according to the complications they pointed out that might occur in untreated or partially treated cases of hypertension.   (n=34)
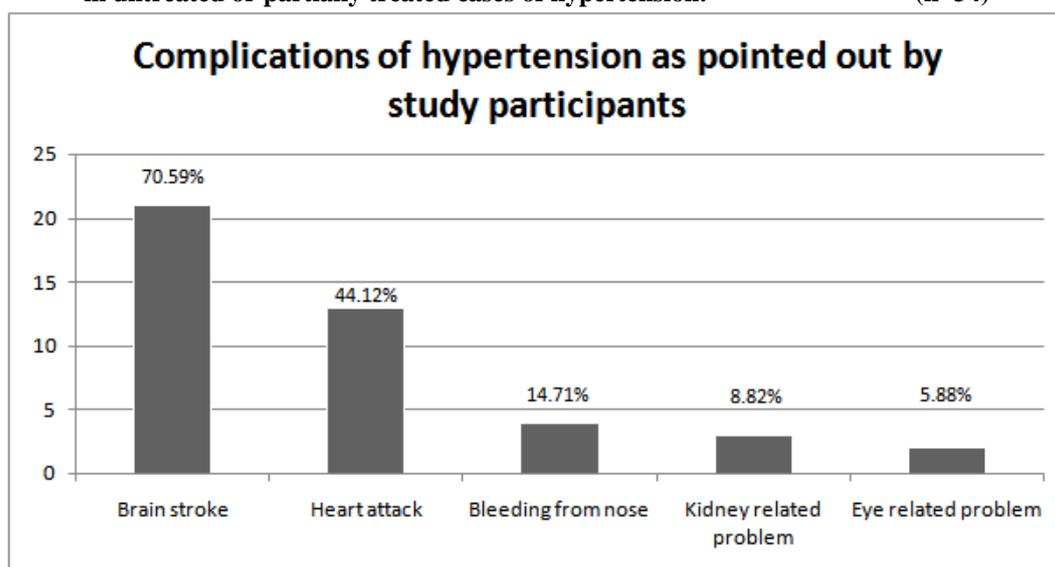
(Multiple response)

Table 2: Distribution of study subjects based on their medication adherence score as per MMAS-8.
(n=52)

Level of medication adherence	Frequency (Percentage)
High	23 (44.23)
Low	29 (55.77)
Total	*52 (100.0)*

Table 3: Association of medication adherence and study variables:

(n=52)

Study variable		Medication adherence		Total	Odds Ratio	95% C.I.	χ^2	df	p value
		Low	High						
Age (years)	<60	22	15	37	1.676	0.501-5.611	0.708	1	0.400
	≥60	7	8	15					
Sex	Female	16	12	28	1.128	0.376-3.382	0.046	1	0.829
	Male	13	11	24					
Religion	Hinduism	19	19	38	0.400	0.107-1.501	1.135 ^	1	0.287
	Islam	10	4	14					
Education	<Secondary	20	9	29	3.457	1.096-10.906	4.629	1	**0.031***
	≥Secondary	9	14	23					
Residence	Rural	10	10	20	0.684	0.222-2.108	0.439	1	0.508
	Urban	19	13	32					
Duration of hypertension	<5years	18	11	29	1.785	0.588-5.416	1.055	1	0.304
	≥5years	9	10	19					
Socio-economic status	≥IV	20	10	30	2.889	0.924-9.029	3.414	1	0.065
	≤III	9	13	22					
Addiction	Absent	17	15	32	0.756	0.243-2.345	0.236	1	0.627
	Present	12	8	20					
Co-morbidity	Absent	16	9	25	1.915	0.630-5.822	1.322	1	0.250
	Present	13	14	27					
No. of medicine doses per day	1	8	4	12	1.810	0.469-6.988	0.287 ^	1	0.592
	>1	21	19	40					
Occupation	Home based	14	13	27	0.718	0.239-2.157	0.349	1	0.554
	Others	15	10	25					
Knowledge about predisposing factors	Knew none	7	4	11	1.765	0.375-8.315	0.062 ^	1	0.803
	Knew ≥1	22	19	41					
Knowledge about complication	Knew none	12	4	16	3.353	0.907-12.391	2.430 ^	1	0.119
	Knew ≥1	14	15	29					

(*) p value <0.05

 (^) after correction for continuity

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