MEDICATION ADHERENCE AND ITS CORRELATES AMONG DIABETIC AND HYPERTENSIVE PATIENTS SEEKING CARE FROM PRIMARY HEALTH CENTER, INDIA

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ABSTRACT

Introduction: Low adherence to prescribed medication in patients with non communicable diseases (NCDs) increases risk of hospitalization and premature mortality. Assessing adherence to medications and its correlates among NCD patients can help in delivering targeted interventions.

Objectives: To assess the level of low adherence to prescribed medications and associated factors among diabetic and/or hypertensive patients registered in NCD clinic at a Rural Health Center in South India.

Methodology: A facility based cross-sectional study was conducted in a RHC of Puducherry, India. All the patients who registered and attended clinic for follow up in August 2014, with either hypertension and/or diabetes and received drug for more than four weeks prior to contact were included in study and adherence was assessed using Morisky Medication Adherence Scale (MMAS-8) questionnaire. The data was entered in Microsoft Excel and was analyzed using SPSS version 20.

Results: Of the 281 included in the study the mean (SD) age was 57.4 (11.9) years and 169 (59.8%) were females. Among these 281, 155 (55.1%) had only hypertension, 46 (16.4%) had only diabetes and 90 (28.5%) had both hypertension and diabetes. Low adherence to medication was seen in 47 (16.7%) participants. In the model factors like education of 1-5years (OR-2.68, CI-1.03–6.98)), education of >6 years (OR-3.50, CI-1.34–9.14), having only diabetes (OR-3.78, CI-1.28-11.17) and tobacco use (3.51, CI-1.24–9.96) were independently associated with low adherence.

Conclusion: Around one-sixth of the patients with either diabetes and/or hypertension were found to be less adherent to prescribed medication. Higher education levels, use of tobacco and having only diabetes were identified independently as risk factors for low adherence.

Key Words: Diabetes Mellitus, Hypertension, Medication compliance, Non communicable diseases, Primary health care

INTRODUCTION

Non Communicable Diseases (NCD) mainly comprises of cardiovascular diseases (CVD), chronic respiratory diseases, cancer, diabetes and mental illness. By 2020, NCD's are expected to contribute to 60% of the global disease burden and 73% of the total mortality.[1] Developing countries like India are undergoing epidemiological transition from communicable to non-communicable diseases.[2] NCD account for 53% of all deaths in India and are estimated to increase up to 67% in 2030.[3] Hypertension and diabetes are the common chronic morbidities which can lead to life-threatening complications like CVD.[4] Systematic review and meta-analysis on prevalence of hypertension in India, 2014 shows overall prevalence of 29.2% in adults aged more than18 years and 27.6% and 33.8% in rural and urban respectively.[5] With 66.8 million affected by diabetes, India ranks second globally.[6] In India, urban and rural divide in non-communicable

disease prevalence is reducing and is expected to diminish very soon.[7]

With increasing NCD burden in India, Ministry of Health and Family Welfare has launched a national program namely, National Program for Prevention and control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS) in the year 2010. It was initiated in 100 backward and remote districts in 21 states as a pilot phase and it is proposed to cover all the districts in the country in a phased manner by the end of 12th five year plan. Under NPCDCS, NCD clinics are functioning in Primary Health Centers (PHC) where investigations and treatment are provided free of cost.[8] Though such facilities are provided in PHC, monitoring of patient's adherence to health advice plays an important role in determining the outcome of these chronic conditions. Adherence is defined as "the extent to which a person's behavior such as taking medication, following a diet and/or executing lifestyle changes corresponds with the agreed recommendations from a health care provider".[9] Among these factors, adherence to treatment is an important factor in prevention of complications. Non-adherence to treatment plays a major role in increasing the all-cause hospitalization, mortality and out of pocket expenditure among patients with diabetes and/ or hypertension.[10]

A study conducted at a tertiary care hospital in South India among diabetic in-patients showed that only 49.3% were adherent to prescribed medications.[11] Similarly, a study among hypertensive patients in South India showed that 45.8% were having low adherence.[12] In India, studies assessing adherence to medication among patients with diabetes and hypertension are mostly limited to patients attending tertiary care facilities.[11-13] But, it is important to assess adherence to treatment and its correlates in those patients attending PHCs as most of them are yet to develop complications. Identifying the non-adherent patients and factors associated with non-adherence will help in guiding targeted interventions in future among these patients to improve adherence and avert complications that may arise due to non-adherence.

With this background, the present study was conducted among patients with either diabetes and/or hypertension registered in NCD clinic at a Rural Health Center (RHC), to assess a) the adherence to prescribed medications and b) socio-demographic and treatment factors associated with low adherence.

METHODOLOGY

Study setting: During the month of August 2014, a facility based cross-sectional study was conducted among patients with either hypertension and/or diabetes seeking healthcare from the NCD clinic, Rural Health Center (RHC), Ram-

anathapuram. The RHC is a Primary Health Center located in Puducherry, India and is 16 kilometers away from the Puducherry main town. It is attached to a tertiary care research institute and is also functioning under the Government of Puducherry. It caters to the health needs of 9852 individuals residing in four socio-demographically and economically similar villages namely Ramanathapuram, Thondamanatham, Thuthipet and Pilayarkuppam. Majority of people in these villages have low economic status, low education status and are dependent on agriculture for living as is the scenario in most of the Indian villages. People here mainly depend on RHC for their health needs. RHC, Ramanathapuram provides round the clock health services which include OPD services from 9 am to 4.30 pm and emergency services in remaining hours. Special clinics for Non Communicable Diseases (NCD), Antenatal care and Well Baby care are scheduled on Wednesday, Thursday and Friday respectively.

The study was carried out among patients attending NCD clinic at RHC, Ramanathapuram. Patients with at least one chronic disease condition like hypertension, diabetes mellitus, coronary heart disease, rheumatic heart disease, asthma, thyroid disorders, epilepsy and psychiatric disorders are registered in NCD clinic. The registered 415 patients are divided into batches of around 105 and each batch visits RHC for consultation and follow-up once in a month. Consultation, drugs for 28 days and necessary laboratory services are provided free of cost during this monthly follow-up visits. Patients are reviewed every Wednesday by trainee doctors under the supervision of medical officer in charge of RHC. During each monthly visit, the details on management are updated in the comprehensive patient case sheets by attending medical doctor. The patients are advised regarding need for regular follow-up visits and lifestyle modifications to combat non communicable disease. The pharmacist educates patients regarding dose and regimen of the prescribed medication to be followed during the course of next four weeks.

Study population: We included all the patients with either diabetes and/or hypertension who are already registered and attending NCD clinic at RHC, Ramanathapuram during the month of August 2014 and had received drugs for at least past four weeks. The patients were interviewed after obtaining a verbal informed consent during their visit to NCD clinic.

Study tool and Study variables: Pretested, semi-structured interview schedule was used to collect information. Pre testing was done in four patients who had both diabetic and hypertension and in three patients who had diabetes alone. It was done in those who attended NCD clinic at a tertiary care hospital. No major changes noted during pre testing of questionnaire. The interview schedule had three components socio-demographic details, details of treatment received and adherence to medication. The component of socio-demographic details included age, gender, village, education,

occupation, marital status and also lifestyle behaviors like alcohol use and tobacco use. The treatment details had variables like type of morbidity, duration of treatment, number of drugs received and dosage. The details of treatment received were extracted using patient case sheets. The adherence to medication was captured with the eight-item Morisky Medication Adherence Scale (MMAS-8) which has eight questions and was graded as low adherence, moderate adherence and good adherence. MMAS-8 is validated in India and other parts of world in different languages with reliability value (α) of 0.83. MMAS scores can range from 0 to 8, with low adherence defined as MMAS scores less than 6; moderate adherence as scores of 6 to less than 8, and good scores as a score of 8.[14-16] The questions were translated and back translated to Tamil and English respectively by two separate bi-linguistic persons for content verification. The interview schedule was administered by trained MBBS interns who were well versed in local language Tamil. The study protocol was approved by the concerned clinic administration panel.

Operational Definitions:

Adherence to medication: Patients having a score of 8 were considered to have *good* adherence. Patient with scores of 6-7 were considered to have *moderate* adherence. Patient with scores of <6 were considered to have *low* adherence.

Duration of Disease: Duration of either diabetes or hypertension whichever was detected first in the patient. For ex: Patient is having Hypertension and Diabetes since two years and one year respectively, then duration of disease is considered as two years.

Dosage: Patients dosage is considered *Once Daily*, *Twice Daily* or *Thrice Daily* if he/she is consuming at least one drug once in a day, two times a day or three times a day respectively.

Number of drugs: Total number of different drugs that the patient has been prescribed by attending medical doctor to consume per day.

STATISTICAL METHODS

The data was entered in Microsoft Excel and was analyzed using IBM developed SPSS version 20. The continuous data like age, duration of disease and number of drugs received were converted into categorical data according to relevance. All the categorical data were presented as percentages. The association between low adherence and categorical variables like age group, gender, education status, occupation, type of disease, duration of disease, dosage and number of drugs was tested using univariate logistic regression. The variables with P value less than 0.1 in univariate logistic regression

were taken for multivariate logistic regression and considered as significant when P value was less than 0.05.[17] The strength of association was mentioned in terms of odds ratio.

RESULTS

Out of 305 registered patients with either hypertension and/or diabetes, eight patients were put on treatment during month of August and 16 patients did not attend clinic during month of August. Hence, 281 patients were included for assessing adherence to medication and its correlates. Of the 281 participants, mean (SD) age was 57.4 (11.9) years and 169 (59.8%) were females. Among participants, 165 (58.7%) were uneducated and 129 (45.9%) were homemakers. Of the total, 36 (12.8%) and 29 (10.3%) participants reported current use of alcohol and tobacco respectively. Socio-demographic details of study participants are shown in Table1.

Of the participants, 155 (55.1%) had only hypertension and 90 (28.5%) had both hypertension and diabetes mellitus. Diabetes mellitus alone was found in 46 (16.4%) of the study participants. Mean (SD) duration of the treatment was 5.2 (4.7) years. The duration of treatment ranged from one month to 30 years. Asthma, epilepsy or hypothyroidism in form of comorbidity was present in 19 (6.8%) of the participants. Of the total, 114 (40.6%) were consuming drugs only once in a day and around 164 (58.4%) had to consume two to three drugs per day. Morbidity profile of study participants are shown in Table 2.

High, moderate and low adherence to medication was seen in 100 (35.6%), 134 (47.7%) and 47 (16.7%) participants respectively. The proportion of low adherence was found to be higher in those having only diabetes (27.7%) compared to those having only hypertension (17.4%) or having both disease conditions (8.8%) and was found to be statistically significant. Lesser age, higher education, being housewife, tobacco use and having only diabetes were significantly associated with low adherence to medication on univariate logistic regression. Variables like age, gender, education, occupation, alcohol use, tobacco use, type of morbidity and duration of morbidity had p value <0.1 and were considered for multivariate logistic regression. Higher education, tobacco use and having only diabetes were significantly associated with low adherence on adjusting for other factors. (Table 3)

The multivariate model was statistically significant (P value=0.002). The model had Nagelkerke R square of 0.182. In the model, factors like education of 1-5years (OR-2.68, CI-1.03–6.98)), education of >6 years (OR-3.50, CI-1.34–9.14), having only diabetes (OR-3.78, CI-1.28-11.17) and tobacco use (3.51, CI-1.24–9.96) were independently associated with low adherence (Table 3).

DISCUSSION

Our study conducted among patients with either hypertension and/or diabetes followed up in a rural PHC showed that 16.7% of the study participants had low adherence to medication. Patients with better education, using tobacco and having only diabetes were found to be independent risk factors for low adherence to prescribed medication in our study.

Arulmozhi and Mahalakshmy, in a study from Puducherry using MMAS-8 scale reported low adherence to medication in 39% patients.[11] Age <60 years, shorter duration of disease (<1 year) were found to be associated with low adherence to medication on univariate analysis similar to our study. This study was conducted among diabetes in-patients who have got complications and are admitted to hospital unlike in our study where patients are not having any complications. Steps taken to improve adherence in patients without complications like in our study can lessen the chances of them developing in the future.

A community based cross-sectional study conducted in rural village of Kerala showed 74% of diabetic patients to be less adherent to medication (using MMAS-8).[18] Similarly another community based cross-sectional study conducted in a rural village of Tamil Nadu showed 75.9% of the hypertensive patients to be less adherent to medication (using MMAS-4).[19] The proportion of low adherence was found to be comparatively low in our setting as RHC is a model training center with patients exposed to repeated education programs and other quality assurance methods. In the same study, factors related to lifestyle like smoking and alcohol and factors related to medication like increase in number and frequency of drugs were associated with low adherence.

A facility based cross-sectional study conducted in a public primary care clinic in China showed 32.6% of the hypertensive patients to have low adherence to medication.[20] As in our study MMAS-8 was used to assess adherence and a score of less than six was considered to be less adherent. Younger age, shorter duration of treatment and being employed were associated with low adherence. Even in our study, patients with younger age and shorter duration of treatment had higher risk for low adherence.

The strengths of the present study are as follows; firstly this study reported adherence among patients with diabetes and/or hypertension attending a public, primary health center (PHC). The majority of these patients seek care from PHC and also the national program promotes follow-up of these patients at PHC's. Hence, detecting the adherence level and its correlates at a PHC will help to find at risk groups for targeted interventions. Secondly, we used MMAS-8 questionnaire which has been widely used to measure adherence to medication; hence it has better internal validity and also comparability. Thirdly, we were also able to cover around 90% of the eligible study population.

The study being conducted in a treating health center may be biased on the assessment of adherence to medication due to social desirability. To partly overcome this, separate counter was set up and the interviews were conducted on a one to one basis by non-treating trainee doctors. The sample size was smaller to detect statistical significance for all the associated factors with low adherence. As the study was conducted over only one month period, the patients who were not able to attend the clinic in that month were missed, though this proportion was less than 10%.

Our study has few implications. Firstly, the study results shows that there is a great need on the part of health care providers to not only prescribe medications but also make sure they are adherent to the prescribed drugs. Secondly, focused health education sessions addressing the importance of adherence to medications need to be carried out regularly. These sessions can be planned during the NCD clinic day which is now incorporated in all PHC's of the country. Lastly, this study emphasizes the need for more studies addressing the cost-effectiveness of improvement in adherence and thus reducing the complications and also health care costs.

There are very few studies which explore the adherence to medication in hypertensive and diabetic patients. Also before planning specific interventions there is need for finding causal effect of the factors which are associated with low adherence. In our study, educated had low adherence to medication; hence qualitative studies will help to find the reason for this low adherence in educated. Without these prior information, health promotion programs will not be able to address the real need of the targeted groups.

CONCLUSION

Among the diabetic and/or hypertensive patients around one-sixth were found to be less adherent to prescribed medications in a rural PHC of South India. Higher education levels, use of tobacco and having only diabetes mellitus were identified independently as risk factors for low adherence to medication. The specific interventions targeted at improving the adherence to medication should focus mainly on these risk groups.

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Table 1: Socio-Demographic factors and morbidity profile of diabetes and/or hypertension patients attending NCD clinic in a rural primary health center, South India (N= 281)

Socio-Demographic factors	Frequency (%)
Age (years)	
30-44	40 (14.3)
45-59	92 (32.7)
≥60	149 (53.0)
Gender	
Male	113 (40.2)
Female	169 (59.8)
Education (years of school)	
No formal Education	165 (58.7)

1-5	45 (16.0)
≥6	71 (25.3)
Occupation	
Unemployed	59 (21.0)
Employed	93 (33.1)
Housewife	129 (45.9)
Marital Status	
Married	261 (92.9)
Separated/Divorced/Widow	20 (7.1)
Alcohol Use (past 1 month)	
Yes	36 (12.8)
No	245 (87.2)
Tobacco Use (past 1 month)	
Yes	29 (10.3)
No	252 (89.7)

Table 2: Morbidity and treatment profile of diabetes and/or hypertension patients attending NCD clinic in a rural primary health center, South India (N= 281)

Morbidity Characteristics	Frequency (%)
Disease Type	
Hypertension only	155 (55.1)
Diabetes only	46 (16.4)
Both	90 (28.5)
Disease Duration (years)	
<1	45 (16.0)
1-5	140 (49.8)
>5	96 (34.2)
Other Co morbidities	
Present	19 (6.8)
Absent	262 (93.2)
Regimen	
Once daily	114 (40.6)
Twice daily	88 (31.3)
Thrice daily	79 (28.1)
Number of Medication	
One	70 (24.9)
Two-three	164 (58.4)
More than Four	47 (16.7)

Table 3: Association of Socio-demographic characteristics and morbidity profile with low adherence to medication among diabetes and/or hypertensive patients attending NCD clinic in a rural primary health center, South India (N= 281)

Characteristics	Total N=281	Low Adherence, n (%)	Odds Ratio (95% CI)	Adjusted odds Ratio (95% CI)
Age in years				
30-44	40	13 (32.5)	3.29 (1.45-7.47)*	2.80 (0.76–5.70)
45-59	92	15 (16.3)	1.33 (0.64-2.78)	1.04 (0.44–2.49)
≥60	149	19 (12.8)	1.00	1.00
Gender				
Male	113	24 (21.2)	1.70 (0.91-3.192)	0.79 (0.24–2.64)
Female	169	23 (13.7)	1.00	1.00
Education				
No formal Education	165	17 (10.3)	1.00	1.00
1-5	45	11 (24.4)	2.82 (1.21-6.56)	2.68 (1.03–6.98)#
≥6	71	19 (26.8)	3.18 (1.54-6.58)*	3.50 (1.34–9.14)#
Occupation				
Unemployed	59	7 (11.9)	1.00	1.00
Employed	93	23 (24.7)	2.44 (0.97–6.11)	1.35 (0.47–3.94)
Home Maker	129	17 (13.2)	1.12 (0.44–2.89)*	1.24 (0.37–4.16)
Marital Status				
Married	261	42 (16.1)	1.00	------
Separated/Divorced/Widow	20	5 (25.0)	1.74 (0.6–5.0)	------
Alcohol Use				
Yes	36	10 (27.8)	2.16 (0.96–4.86)	1.64 (0.56–4.83)
No	245	37 (15.1)	1.00	1.00
Tobacco Use				
Yes	29	10 (34.5)	3.06 (1.32–7.10)*	3.51 (1.24–9.96)#
No	252	37 (14.7)	1.00	1.00
Disease Type				
Hypertension only	155	27 (17.4)	2.20 (0.91–5.30)*	1.99 (0.78-5.07)
Diabetes only	46	13 (27.7)	4.18 (1.50–11.42)	3.78 (1.28-11.17)#
Both	90	7 (8.8)	1.00	1.00
Disease Duration				
<1	45	11 (24.4)	2.78 (1.08-7.15)	1.22 (0.41-3.67)
1-5	140	26 (18.6)	1.96 (0.90–4.28)	1.33 (0.56-3.17)
>5	96	10 (10.4)	1.00	1.00
Other Co morbidities				
Present	19	3 (15.8)	0.93 (0.26–3.32)	------
Absent	262	44 (16.8)	1.00	------
Dosage				
Once daily	114	17 (14.9)	0.98 (0.44–2.18)	------
Twice daily	88	18 (20.5)	1.44 (0.64–3.20)	------
Thrice daily	79	12 (15.2)		

Number of drugs				
One	70	13 (18.6)	1.56 (0.55–4.44)	------
Two-three	164	28 (17.1)	1.40 (0.54–3.63)	------
More than Four	47	6 (12.8)	1.00	

*p value < 0.05, #p value <0.05 in multivariate analysis