Exploring medication adherence and its determinants among hypertensive, diabetic, and hyperlipidemic patients in the OPD of a tertiary care hospital

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Background
Medication adherence is a major concern in clinical outcomes, especially in developing countries. Despite the work of several studies, nonadherence remains a universal problem and still needs to be explored. The lifelong therapy for chronic illnesses itself becomes a barrier to medication adherence.
Objective
To assess the prevalence of medication adherence and its barriers and facilitators among patients suffering from four noncommunicable diseases (HTN, T2DM, hyperlipidemia, and COPD).
Materials and methods
A prospective cross-sectional study was conducted in the outpatient department of a tertiary care hospital in Vadodara. A structured online survey questionnaire was framed with specific sections to capture information related to the patient's adherence behaviorr. Before the sample collection, a questionnaire was pretested among 30 patients until saturation was obtained. A total of 400 individuals were recruited for the study after screening for the inclusion criteria.
Results and conclusion
Of the participants, 54.5% were males and 45.5% were females; out of the participants 41.75% had hypertension and 23.25% had diabetes mellitus. The participants with hyperlipidemia were too low to be statistically analyzed and hence they were the ones excluded. Overall, 60% of medication adherence and 40% of medication nonadherence were observed. A significant proportion of people were nonadherent, as a result of underlying factors that affected their adherence. This suggests the need for healthcare professionals and healthcare policymakers to work toward improving adherence rates among patients to achieve better clinical outcomes. If adherence rate is overlooked, the most effective treatment will also be a failure as adherence will remain a hindrance to the overall healthcare system.

Keywords:
barriers, chronic illnesses, facilitators, medication adherence

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Introduction

Chronic illnesses, being the leading cause of mortality, constitute up to 35% of deaths in India [1]. Over the past few decades, there has been a substantial increase in the population incidence of chronic illnesses majorly due to an increase in urbanization and subsequent modifications in lifestyle, diet, and physical activity [2]. This has led to deterioration of overall health and quality of life. These chronic illnesses are often discussed in terms of three diseases : hypertension (HTN), diabetes mellitus type-II (T2DM), and hyperlipidemia. Medicines play an indispensable role in the treatment of chronic conditions, and the efficacy of treatment depends on drug efficacy and medication adherence. However, adherence remains poor in long-term therapy [3].

The World Health Organization (WHO) defines medication adherence as 'The extent to which a person's behavior of taking medication corresponds with agreed recommendations from a healthcare provider [4].' Medication adherence poses a challenge to all the effective therapies available for chronic conditions; drug nonadherence is a universal problem rather than a disease-specific or drug-specific problem [5]. Nonadherence is a huge limitation that hinders the success and safety of many

pharmacotherapies consequently making it difficult to achieve targeted outcomes [4].

Drug adherence rates are different among patients with different chronic conditions. For instance, a systematic review of 42 studies across 19 developing countries showed that the mean prevalence of medication adherence (MA) among hypertensive patients was 47.34% [2]. A study conducted in Belapur, Navi Mumbai on 208 individuals,85 of them on T2DM treatment and 164 on antihypertensive treatment found that all the patients admitted discontinuing medicines for a considerable amount of period at some point after they were diagnosed [6]. Likewise, adherence to statins for hyperlipidemia is observed to be far from optimal [7].

Medication adherence is influenced by a myriad of factors and is a multifactorial event [2]. These factors are grouped into five categories under the WHO conceptual framework: Patient-related factors, therapy-related factors, socioeconomic factors, healthcare-system-related factors, and disease-related factors [4]. Many researchers are working to develop and propagate self-management guidelines that can improve motivation and adherence among patients.

The global scenario of adherence is critical and requires efforts and action from all the societal and governmental levels. Interventions are effective measures designed in a way that increases patients' adherence to their therapies. However, 'one-size-fits-all' strategies may not be suitable in the current scenario [8]. Pharmacists are well-positioned to optimize patients' adherence to therapy and help them overcome such barriers. Educational interventions by pharmacists that involve patients and their family members can improve medication adherence [9]. Moreover, involving nonphysician healthcare professionals is a better strategy for source-restrained nations like India [10]. Since counseling and education alone may not be sufficient for improving MA, patients' needs and specific barriers should be considered [8].

Generally, physicians are not exactly aware of the extent of adherence in their patients. It is imperative to remain abreast of the level of adherence among patients to plan effective treatment regimens. Although there are substantial efforts to report the topic of MNA, adherence rates are still disapprovingly low. Therefore, the design and development of disease-management programs and various strategies should be considered to fulfil the specific needs of the patient.

Materials and methods

A prospective, cross-sectional survey study was conducted in OPD clinics of Parul Sevashram Hospital, Vadodara, Gujarat, India. It is a 750-bedded multi-specialty teaching hospital. Three departments of the clinic were targeted: Cardiovascular and endocrine to include hypertensive, diabetic, and hyperlipidemic patients in this study. The study was approved by the Human Ethics Committee of the hospital and was conducted for 6 months.

Designing the questionnaire

By taking the aims and objectives of the study into consideration, a questionnaire was prepared. Six sections with 28 questions were included in the questionnaire. Questions from each section captured specific details of the patients along with free-list exercises to gather data on reasons for barriers and facilitators of medication adherence. The final section of the questionnaire included information related to the particularity of consuming medicines along with the number of skipped doses in the past 30 days, which helped to assess the rates of medication adherence and nonadherence.

Validation of questionnaire

A structured survey questionnaire was developed by integrating specific sections to capture information related to sociodemographic characteristics, clinical history, and medication adherence. A free-list exercise was used to collect data on perceived facilitators and barriers related to medication adherence. The questionnaire was pilot-tested among 30 patients before finalizing, and then the questionnaire was amended accordingly. The finalized version was updated and used to create an online survey form. After achieving the targeted sample size of the study, data was analyzed.

Study sample size

In total, 400 participants were included in the study after screening them for the inclusion criteria and were explained about the purpose and significance of the proposed study and the consent process. Patients giving consent for participation were surveyed for scrutiny purposes.

Study for analysis

Sample characteristics and prevalence were reported as frequencies (percentages) and mean using descriptive statistics<AQ: Pls check whether the change is fine>. Age- and disease-specific risk factors, contributing to MNA, were reported using univariate analysis.

Chi-square test was used for categorical data. A value of $P<0.05$ was accepted as statistically significant. Multivariate analysis, where appropriate, was carried out using multiple logistic regression and findings were reported as odds ratio (OR) and 95% confidence interval (CI).

The analysis explored any possible differences in medication adherence among patients of different sexes, age groups, suffering from different conditions, their perceived barriers/facilitators, and other factors critical to understanding context-specific factors for improving medication adherence.

Results and discussions

The adherence rate was calculated by taking into account the number of participants who strictly followed the treatment regimen or only rarely skipped doses. Rest who fell under the category of often skipping doses or sometimes skipping doses were considered nonadherent in the study.

The results of the study illustrated that almost 40% of the population did not adhere to the recommended dosage regimen and faced multiple barriers in adhering to medications. People generally fail to consider hypertension, diabetes, and hyperlipidemia as chronic conditions that require long-term adherence, due to their asymptomatic course and lack of awareness [6].

In this study, men constituted 54.50% of the participants; a study from Karnataka had almost similar Sex proportions [11]. Sex did not influence medication adherence. This was contradicted by a study based on statin discontinuation, where women were more likely to be nonadherent [12]. The mean age of participants was 58.2 years suggesting a greater proportion of the elderly population.

It was noted that people belonging to nuclear families were more adherent (55.62%) than people living in extended families. This was supported by another study from South India where a good association was shown between adherence and the nuclear family [13]. It can be attributed to the fact that people living in extended families might be too involved in household chores (especially women) to take care of themselves.

Forward education and adherence showed a noteworthy association; people without formal education have a greater level of nonadherence (20.62%), and individuals who had some level of education had a greater rate of adherence (70.41%). This was supported by a study on 400 participants where the level of education significantly impacted adherence [11]. A plausible explanation is that people with education might understand the significance of medication adherence, while illiterate people seldom realize it. However, a contrary observation was documented in a study where the authors proposed that highly literate people may believe in their judgment much more than following a physician's recommendations [14].

The strength of the study lies in examining adherence in four different chronic conditions along with the comorbidities. It was observed that people with hypertension alone tend to be more nonadherent (51.77%). A study conducted among Canadians with hypertension revealed that most patients felt that their blood pressure was in control, so there was no absolute necessity to continue taking them regularly [15]. There was a negligible difference between adherence rates in patients with T2DM. What is interesting to note is that patients with HTN along with T2DM had a greater proportion of adherents (29.43%) as compared with nonadherents (21.98%). This was supported by a study conducted on drug adherence rates among seven diseases, where it was seen that as the comorbidity burden increased, adherence increased a little across all the diseases [5]. Notably, this data differs from other studies where more morbidities were associated with low adherence to treatment [11,16].

When considering the level of control of these conditions among the participants, 44.4% of the participants with HTN and 47.6% of the participants with T2DM had elevated laboratory values suggesting a lack of control of their disease. A study revealed that those who do not adhere to their antihypertensives were 27 times more prone to have uncontrolled disease [17].

Factors affecting medication adherence and nonadherence

Numerous barriers were encountered among nonadherent patients such as: Forgetfulness, the top reason for nonadherence (98%); traveling (68%), busy schedule (48%); does not feel the need to take medicines (28%); and social function (25%). Moreover, misconceptions/false beliefs, lack of counseling, lack of trust in the doctor, side effects, and refill not done were other thought-provoking barriers for medication nonadherence. However, some of the facilitators for medication adherence were also noted and among them, routine/habit

(77%), family support (66%), and self-motivation (55%) constitute the highest recorded responses of the patients.

Observations from field notes

Most nonadherent hypertensive patients claimed that if they skipped doses in the morning, then they take them in the afternoon or evening. This increases the chances of double dosing which is a wrong practice and such patients are also considered nonadherent.

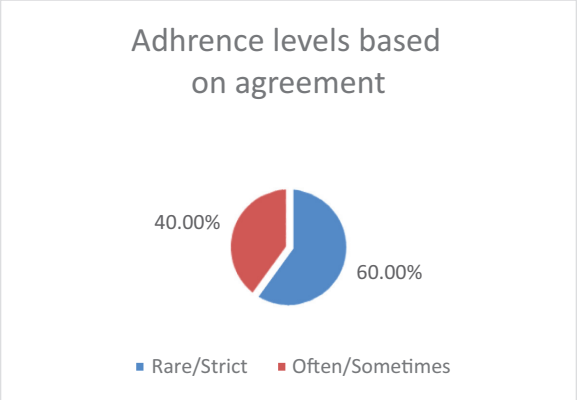
Many patients felt that their disease was in control, so there was no need for them to go for follow-up and hence often missed the dose. This may be due to false beliefs or misguidance.

Some patients complained about the lack of facilities and availability of medicines at their site, more precisely the same brand. One such example is when a patient said 'Doctor gave me medicines but after completion of medicines, I did not refill them as it was not available in my hometown MP.' This suggests that patients were not aware of the importance of continuity of medicines. This might also suggest that different brand names might be available and hence patients get confused. Hence, the practice of prescribing generic medicines should be implemented.

Limitations

The study's generalizability is limited as the enrolled patients and the study site are from Vadodara City only. Moreover dignity, sincerity, and honesty regarding their adherence to the medication of patients are uncertain to some degree. As free listing is totally about noting patients' responses, it might have been possible that the patient forgot some essential information.

Figure 1



Adherence levels based on agreement.

Conclusion

The prevalence of adherence and nonadherence based on our study was found to be 60% and 40%, respectively. A considerable proportion of patients were nonadherent as a result of underlying factors such as forgetfulness, busy schedule, etc that affected their adherence. This suggests the need for healthcare professionals to form patient management strategies that help in incorporating various techniques of medication adherence into their daily routine. Moreover, family support was observed to be the second major facilitator behind patient adherence. Thus, educating and encouraging patients and their

Table 1 Sociodemographic distribution of the study participants

Demographic details	Total *n*=400 (%)
Mean age	58.2
Sex	
Female	182 (45.5%)
Male	218 (54.5%)
Educational level	
No schooling	77 (19.25%)
Primary till 8th	142 (35.54%)
Secondary till 9-10th	76 (19%)
Higher secondary till 11-12th	55 (13.75%)
ITI/Diploma	5 (1.25%)
Bachelor's degree	42 (10.5%)
PG/PhD	3 (0.75%)
Employment	
Unemployed	36 (9%)
Partial employment (daily wages)	32 (8%)
Employed (salaried)	44 (11%)
Self-employment	101 (25.25%)
Retired (pensioned)	20 (5%)
Retired (nonpensioned)	39 (9.75%)
Homemaker	128 (32%)
Living status	
Living alone	9 (2.25%)
Nuclear family	221 (55.25%)
Extended family	170 (42.5%)
Marital status	
Married	337 (84.25%)
Unmarried	11 (2.75%)
Widowed	52 (13%)

Table 2 Disease-wise distribution of study participants

Diseased condition	Total *n*=400 (%)
HTN	167 (41.75%)
T2DM	93 (23.25%)
Hyperlipidemia	5 (1.25%)
HTN + T2DM	94 (23.5%)
HTN + hyperlipidemia	8 (2%)
T2DM+hyperlipidemia	2 (0.5%)
HTN + T2DM+hyperlipidemia	31 (7.75%)

Table 3 Prevalence of elevated laboratory parameters

Clinical laboratory parameters	Total elevated *n*=153 (%)
HTN	
SBP (<130 mmHg)–DBP (<85 mmHg)	68 (44.44%)
T2DM	
HbA1c (<5.7%)	6 (3.9%)
PP2BS (140–160 mg/dl)	12 (7.8%)
FBS (<100 mg/dl)	26 (16.99%)
RBS (<140 mg/dl)	29 (18.95%)
Hyperlipidemia	
TC (<200 mg/dl)	4 (2.61%)
LDL (<130 mg/dl)	3 (1.96%)
VLDL (<30 mg/dl)	3 (1.96%)
HDL (>60 mg/dl)	2 (1.31%)

*__Note:__ For calculation of the percentage of people whose laboratory parameters were elevated for a particular disease condition, it was taken into account the cumulative total of elevated laboratory parameters of all three diseases.

caregivers might help achieve profitable results. As no single intervention can completely eradicate the nonadherence, multidimensional approaches should be designed and implemented to reduce the overall burden of nonadherence (Fig. 1, Tables 1–6).

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Conflicts of interest

The authors declare there are no conflicts of interest.

Table 4 Association of medication adherence with the study variables

	Adherence			
Parameter	Often/some times	Rarely/strict	Odds ratio	*P* value
Condition	*n*=141 (%)	*n*=214 (%)	1.66	<0.0001
HTN	73 (51.77%)	95 (44.39%)		
T2DM	37 (26.24%)	56 (26.16%)		
HTN + T2DM	31 (21.98%)	63 (29.43%)		
Disease control	*n*=56 (%)	*n*=87 (%)	1.64	<0.0001
Elevated blood pressure	31 (55.35%)	35 (40.22%)		
Elevated blood sugar	24 (42.85%)	47 (54.02%)		
Elevated blood cholesterol	1 (1.78%)	5 (5.74%)		
Cost	*n*=124 (%)	*n*=182 (%)	1.67	<0.0001
Free of cost	24 (19.35%)	37 (20.32%)		
Paid	100 (80.64%)	145 (79.67%)		
Mean age	55.47	59.99	1.92	<0.0001
Sex	*n*=160 (%)	*n*=240 (%)	1.67	0.0001
Female	78 (48.75%)	104 (43.33%)		
Male	82 (51.57%)	136 (56.43%)		
Education level			1.67	0.0001
No schooling	33 (20.62%)	44 (18.33%)		
Some schooling	104 (65%)	169 (70.41%)		
Diploma/Bachelor/PhD	23 (14.37%)	27 (11.25%)		
Employment			1.67	0.0001
Some sources of earning	88 (55%)	109 (45.41%)		
No source of earning	72 (45%)	131 (54.58%)		
Living status			1.67	0.0001
Nuclear family	89 (55.62%)	141 (58.75%)		
Extended family	71 (44.37%)	99 (41.25%)		
Check-up place	***n*=159 (%)**	***n*=241 (%)**	1.66	0.0001
Private clinic	129 (81.13%)	195 (80.91%)		
Government hospital	30 (18.86%)	46 (19.08%)		
Duration of change in medication			1.66	0.0001
Within the past 3 years	159 (100%)	241 (100%)		
Never	0	0		
Skipped doses in the past 30 days			1.66	0.0001
0	3 (1.88%)	178 (73.85%)		
≥1	156 (98.11%)	63 (26.14%)		
X^2=239.89		Df=(*n*-1)=23-1=22		

*__Note__: Since the number of participants with hyperlipidemia was insufficient for statistical evaluation, they were excluded to minimize the error.

Table 5 Long-term adherence based on particularity

Parameters	*N*
Strict	163
Rare	77
Sometimes	72
Often	88

*__Note:__ Here we assume, participants who skipped 0 doses = strict, 1 or 2 doses = rare, 3 or 4=sometimes, and ≥5=often. Study participants were asked, in general, regarding how strictly they consume medicines. Among them, 163 were strict, 77 rarely missed doses, 72 missed doses sometimes, and 88 missed doses very often.

Table 6 Skipped doses within past 30 days

Skipped dose within the past 30 days	*n*
0	181
1 or 2	101
3 or 4	46
≥5	72

*__Note:__ Medication nonadherence was considered in patients who have skipped ≥1 dose in the past 30 days. A total of 181 participants did not skip even a single dose within the past 30 days. 101 said they skipped 1 or 2 doses within the past 30 days. Only 46 skipped 3 or 4 doses within the past 30 days and around 72 skipped doses more than 5 times.

References

1 Patel V, Chatterji S, Chisholm D, Ebrahim S, Gopalakrishna G, Mathers C, *et al.* Chronic diseases and injuries in India. Lancet 2011; 377:413–428.

2 Dhar L, Earnest J, Ali M. A systematic review of factors influencing medication adherence to hypertension treatment in developing countries. Open J Epidemiol 2017; 7:211–250.

3 DiMatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. Med Care 2004; 42:200–209.

4 Sabaté E, Sabaté E, editors. Adherence to long-term therapies: evidence for action. Saudi Arabia: World Health Organization; 2000.

5 Briesacher BA, Andrade SE, Fouayzi H, Chan KA. Comparison of drug adherence rates among patients with seven different medical conditions. Pharmacotherapy 2008; 28:437–443.

6 Kotian SP, Waingankar P, Mahadik VJ. Assessment of compliance to treatment of hypertension and diabetes among previously diagnosed patients in urban slums of Belapur, Navi Mumbai, India. Indian J Public Health 2019; 63:348–352.

7 Lansberg P, Lee A, Lee ZV, Subramaniam K, Setia S. Nonadherence to statins: individualized intervention strategies outside the pill box. Vasc Health Risk Manag 2018; 14:91–102.

8 Jaam M, Awaisu A, Ibrahim MI, Kheir N. Factors influencing medication adherence in diabetes mellitus: developing a holistic conceptual framework model. Res Soc Adm Pharm 2017; 30:e7.

9 Enuga E, Ramakrishnan SR, Vanitha, Rani N, Thennarasu P, Kannan G. Impact of continuous patient counselling on knowledge, attitude, and practices and medication adherence of diabetic patients attending outpatient pharmacy services. Asian J Pharm Clin Res 2016; 9:364–369.

10 Abdulsalim S, Unnikrishnan MK, Manu MK, Alrasheedy AA, Godman B, Morisky DE. Structured pharmacist-led intervention programme to improve medication adherence in COPD patients: a randomized controlled study. Res Admin Pharm 2018; 14:909–914.

11 Angadi NB, Kavi A, Torgal SS. Therapeutic adherence among elderly with chronic diseases residing in urban area of South India-A descriptive cross sectional study. Biomed Pharmacol J 2020; 13:2109–2116.

12 Ofori-Asenso R, Jakhu A, Curtis AJ, Zomer E, Gambhir M, Jaana Korhonen M, *et al.* A systematic review and meta-analysis of the factors associated with nonadherence and discontinuation of statins among people aged≥ 65 years. Gerontol: Ser A 2018; 73:798–805.

13 Ajithkumar K, Neera PG, Rajani PP. Relationship between social factors and treatment adherence: a study from south India. Eastern J Med 2011; 16:147.

14 Ingebrigtsen TS, Marott JL, Nordestgaard BG, Lange P, Hallas J, Dahl M, Vestbo J. Low use and adherence to maintenance medication in chronic obstructive pulmonary disease in the general population. J Gen Intern Med 2015; 30:51–59.

15 Gee ME, Campbell NR, Gwadry-Sridhar F, Nolan RP, Kaczorowski J, Bienek A, *et al.* Outcomes Research Task Force of the Canadian Hypertension Education Program. Antihypertensive medication use, adherence, stops, and starts in Canadians with hypertension. Can J Cardiol 2012; 28:383–389.

16 Tavares NU, Bertoldi AD, Thumé E, Facchini LA, França GV, Mengue SS. Factors associated with low adherence to medication in older adults. Revista de Saudepublica 2013; 47:1092–1101.

17 Yiannakopoulou ECh, Papadopulos JS, Cokkinos DV, Mountokalakis TD. Adherence to antihypertensive treatment: a critical factor for blood pressure control. Eur J Cardiovasc Prev Rehabil 2005; 12:243–249.