



# **Factors Associated with Adherence to Medication among Chronic Obstructive Pulmonary Disease Patients in Tertiary Care Hospital of Nepal: A Cross-Sectional Study**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author SN designed the study, performed the statistical analysis and wrote the protocol and wrote the first draft of the manuscript. Authors NRM, SS, AG and PT managed the analyses of the study. Authors SN, SS and NRM managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Objective:** Patients with chronic obstructive pulmonary disease (COPD) are known to have poor medication adherence in Nepal. Various factors affect the medication adherence of COPD patients. Therefore, we aimed to evaluate the medication adherence and its associated factors among the COPD patients in tertiary care hospitals in central Nepal.

**Methods:** A hospital-based cross-sectional study was carried out among 164 patients aged  $\geq 18$  years, diagnosed with and under medication(s) of COPD for at least 6 months from September 2017 to March 2018, in a tertiary care hospital in central Nepal, using a purposive sampling technique. Morisky Green Levine Adherence (MGLA) score was employed to determine the rate of

medication adherence. The differences between the two groups (adherent and non-adherent) were tested using independent t-test, and Chi-square tests,  $p < 0.05$  was considered statistically significant.

**Results:** Patients were mostly  $\geq 60$  years (87.1%) and female (56.7%). The majority of the patients were found adherent to the prescribed treatment (108; 65.9%). The major reason for non-adherence was seen to be stopping medicine when feeling better (41.08%) and most of the patients had discontinued the medication due to experience of symptomatic relief (42.9%). Medication adherence was statistically significant with age group at  $p = 0.040$ , educational status  $p = 0.020$ , no. of daily drugs  $p = 0.029$ , and health behavior of the patients ( $p = 0.025$ ).

**Conclusion:** Our study suggested that two-third of COPD patients were adherent to their medication, and age, education, number of drugs, and health behaviors of the patients were the most influencing factors for medication adherence.

*Keywords: Chronic illness; COPD; medication adherence; factor associated.*

## 1. INTRODUCTION

COPD is one of the serious health problems around the globe. It has been estimated that this disease is responsible for around 5% death worldwide and by the year 2020, it is expected to be the third leading cause of death [1]. It has been projected that COPD-associated mortality will increase by 160% in the Southeast Asian region in the coming decades [2]. Exposure to risk factors such as cigarette smoking, air pollution, and increase longevity of the population is even higher in low-and middle-income countries like Nepal [3]. Some studies conducted in Nepal have reported the prevalence of COPD ranging from 23% to 43% [4]. COPD is the most (43%) common non-communicable disease (NCD) among outpatients followed by cardiovascular diseases [5]. The predisposing factor for COPD is the interactions between environmental exposures and genetic predispositions [6].

COPD is a chronic disease that reduces the quality of life of patients in all aspects of life [7]. It requires continuous treatment to control symptoms, slow the disease progression, and hence improve the quality of life of the patient. Medication adherence is directly associated with treatment efficacy, patient safety, drug resistance, and health care costs to the patients. However, medication nonadherence reduces treatment benefits and even can raise questions to the effectiveness of the clinician's assessment of therapeutic procedure. Many studies have reported on poor adherence of COPD patients to their medications [8,9] and it is also evident that the nonadherence accounts for 30–50% of treatment failures in COPD patients [4,10].

Several studies have investigated the factor associated with medication adherence among COPD patients [6,11]. Factors such as multiple morbidities, medications, delivery devices, patient attitude, and health professionals caring for their patients were found to adversely affect COPD medication adherence [12]. Some studies have highlighted that smoking and the use of cost-saving strategies are the factors negatively associated with adherence, whereas age and severity of COPD are the factors positively associated with adherence to COPD therapy [12,13]. Similarly, a study conducted among COPD patients in Nepal had demonstrated that nearly two-thirds of the patients were non-adherence to medications and the common reasons associated were an experience of side effects of drugs, forgetfulness, and polypharmacy [6]. Since predictors of COPD medication adherence are not well known in Nepal, it has become a necessity to identify the factors associated with the improvement of COPD management within a real-world setting [12]. Therefore, we aimed to evaluate the medication adherence and factors affecting medication adherence in patients with COPD in a tertiary care hospital, Chitwan, Nepal.

## 2. METHODS

### 2.1 Study Design

A cross-sectional study was conducted at the medication counseling center of the Chitwan Medical College Teaching Hospital, Chitwan, Nepal, from September 2017 to March 2018.

### 2.2 Study of Population.

Patients aged  $\geq 18$  years, diagnosed with and on medication(s) for COPD for at least 6 months

were eligible to be included in the study. Pregnant or lactating mothers, those with a psychiatric disorder, a history of asthma, allergic rhinitis, lung operation or another respiratory disease, a serious concomitant disease such as serious heart failure or serious liver or renal failure, an acute coronary syndrome or acute cerebrovascular disease in the last 3 months and those unable to communicate and understand the Nepali language were excluded.

### 2.3 Data Collection and Measurement Tool

A face-to-face interview was used to collect data. The data collection sheet consisted of questions on demography (age, sex, education, marital status, and smoking behavior), clinical characteristics (stage of COPD along with dose, frequency, duration, quantity, and comorbidities), participant's beliefs, experiences, and behaviors regarding both disease and treatment were recorded using other 27 structured questionnaires. The rate of medication adherence (MA) was determined using a validated instrument, the Morisky Green Levine Adherence (MGLA) score. MGLA score is a 4-item structured instrument in which four questions have dichotomous (Yes, No) responses. According to this scale, a score of three or four indicates low adherence, a score of 1 or 2 indicates a moderate level of adherence, and a score of zero indicates a high level of adherence. Tools were translated in the Nepali version, and the Cronbach's alpha of the tool was found to be 0.80. The English form of the questionnaire was translated into the Nepali language. Pilot testing was done on ten patients with COPD (5 males and 5 females) those who meet our inclusion and exclusion criteria and the reliability using Cronbach's alpha test was  $\alpha=0.801$ . Patients involved in pilot testing were not included in the main study.

### 2.4 Sample Size

The sample size planned for this study was 164 which was based on information provided by a study conducted by Bhandari et al., (2014) [3]. As per this study, the hospital-based prevalence of COPD in Nepal is 12%. Setting the worst acceptable level at 5.0% and a confidence interval at 95.0%, a sample size of 164 was concluded using EPI Info 6 (Stat Calc).

### 2.5 Statistical Analysis

Data were entered in Microsoft Excel 2013. The entered data were transferred to IBM-SPSS 20.0 (IBM Corporation, Armonk, NY, USA) for further analysis. The differences between the two groups were tested using an independent t-test, and the association was measured by the Chi-square test.  $P<0.05$  was considered statistically significant.

## 3. RESULTS

Based on the scoring of MGLAs, the majority of the patients (108; 65.9%) were found adherent to the prescribed treatment, as shown in Fig. 1. Majority of the patients (83; 41.08%) stop the medicine sometimes when feeling better, as shown in Table 1.

Medication adherence was statistically significant with age group at  $p=0.040$ , educational status  $p=0.020$ , and no. of daily drugs  $p= 0.029$ , as predicted in Table 2.

Of the 164 patients, the majority of them (115; 70.12%) used both bronchodilator and corticosteroids inhaler, while 9 (5.84%) of them used bronchodilator only, as shown in Fig. 2.

Table 3 shows that health beliefs of the patients, two-third (110; 67.1%) of the patients had a belief that they had sufficient understanding about their illness, while 159 (97%) of them believed that their medications are working, and about 155 (94.5%) patients believed that their doctors are quite knowledgeable about their illness. Likewise, more than two-thirds of the patients (78.65%) had perceptions that their disease can only be managed, 14.02 % of the patients thought their disease is not curable, while only 7.31% thought it is curable, as predicted in Fig. 3.

The health experiences of the patients have been depicted in Table 4. One-fifth (57, 34.8%) of the patients were concerned about the side effects of medication, and 60 (83.3%) of them felt difficulty in handling the inhalers. Likewise, majority of the patients (149; 90.9%) were satisfied with the information provided by the health care professionals, 139 (84.8%) experienced support from their families, and one-third of the patients (56; 34.1%) experienced financial difficulties that limited their access to health care, whereas 157 (95.7%) of the patients felt that management of illness rather disturbed their life.

Table 5 shows the behaviors of the patients towards medication adherence. More than half of patients (97; 59.1%) had a strict routine for regular medicines and 160 (97.6%) of them kept their regular medicine near to them. Regarding patients using rotahaler, 113 (68.9%) wash their rotahaler at least twice a week. About two-thirds of the patients (106, 64.6%) stored their rotahaler in its box, while 37 (22.6%) of them knew that the new rotahaler should be used for only 6 months. Similarly, the majority of the patients (129;

78.7%) gargle their mouth after using a corticosteroid inhaler. Approximately 77 (47%) patients discontinue their medication and the major reason for discontinuation was the symptomatic relief (33; 42.9%). More than half (97; 59.1%) of the patients felt difficulty in handling the rotahaler properly, 46 (28.04%) patients felt difficulty in performing step 4 and 8 of proper rotahaler handling procedure, while only one felt difficulty in performing step 3 and 4, as illustrated in Fig. 4.

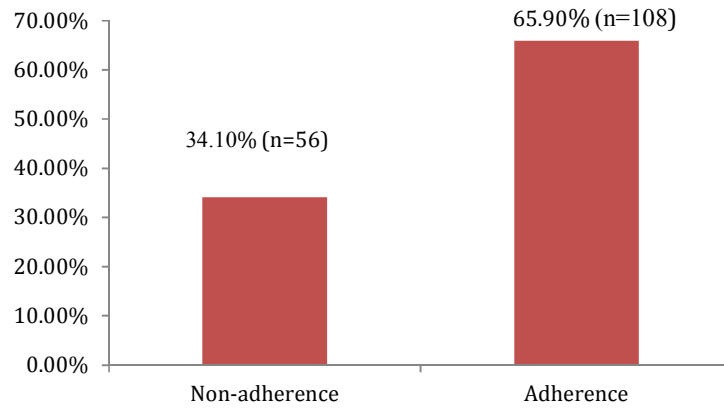


Fig. 1. Medication adherence rate

Table 1. Patients Responses on MGLA questions

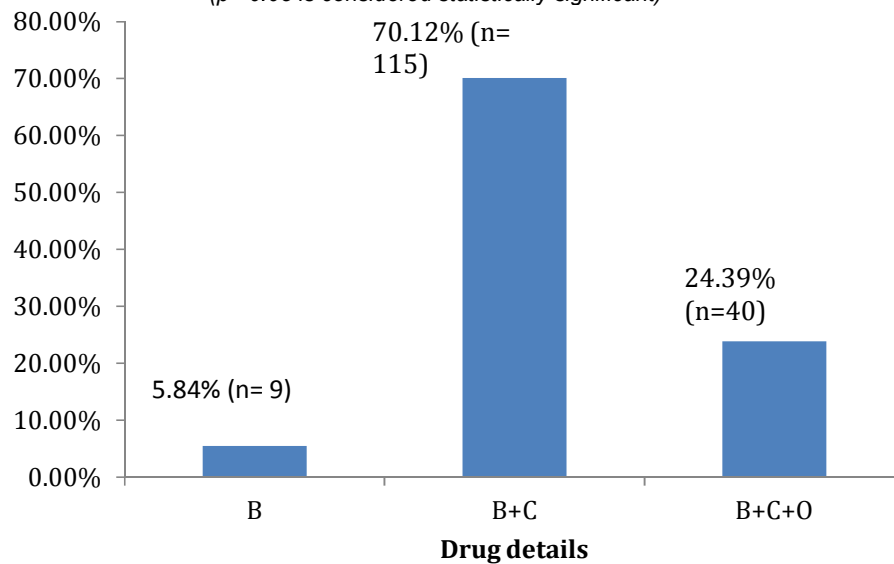
MGLA questions	Frequency	Percentage
Ever not taking medicine due to forgetfulness	68	33.66
Doing negligence about taking medicine	20	09.90
Stop medicine sometimes when feeling better	83	41.08
Stop taking medicine when feeling worse	31	15.34

Table 2. Association between medication adherence and socio-demographic and clinical variables

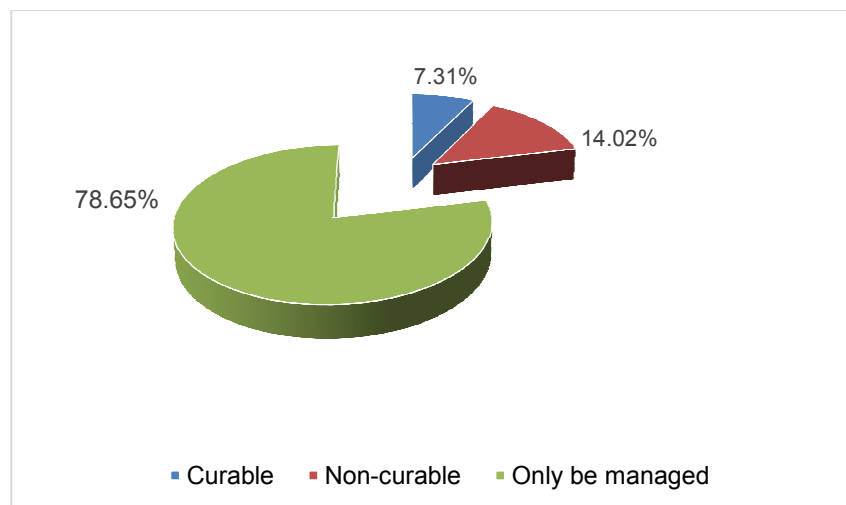
Characteristics	Non-adherence	Adherence	$\chi^2$ Value	p Value
<b>Age</b>				
<= 60 Years	3	18	4.225	0.040*
> 60 Years	53	90		
<b>Gender</b>				
Male	19	52	3.037	0.081
Female	37	56		
<b>Educational status</b>				
Illiterate	23	65	5.418	0.020*
Literate	33	43		
<b>Smoking history (present /past)</b>				
Yes	42	88	0.943	0.332
No	14	20		
<b>Cigarette per day</b>				
<= 5 sticks	5	6	0.950	0.330
>5 sticks	37	82		

Regular medications at present				
Yes	28	51	0.114	0.736
No	28	57		
No. of daily drugs				
<= 2	18	54	4.775	0.029*
> 2	38	54		
Co-morbidities				
Yes	27	51	0.015	0.904
No	29	57		
Stage of severity				
First	3	11	4.154	0.245
Second	20	20		
Third	18	47		
Fourth	15	20		

( $p < 0.05$  is considered statistically significant)



**Fig. 2. Drugs use among the patients**  
B: Bronchodilators; C: Corticosteroids; O: Others



**Fig. 3. Perception about the disease**

**Table 3. Health beliefs of the patients**

<b>Health beliefs of the patients</b>	<b>n (%)</b>
Sufficient understanding of illness	110 (67.1)
Medications are working	159 (97)
On too many medicines	72 (43.9)
If yes, number of drugs (n=72)	
≤2	2 (2.8)
> 2	70 (97.2)
Doctors are very knowledgeable	155 (94.5)

**Table 4. Health experiences of the patients**

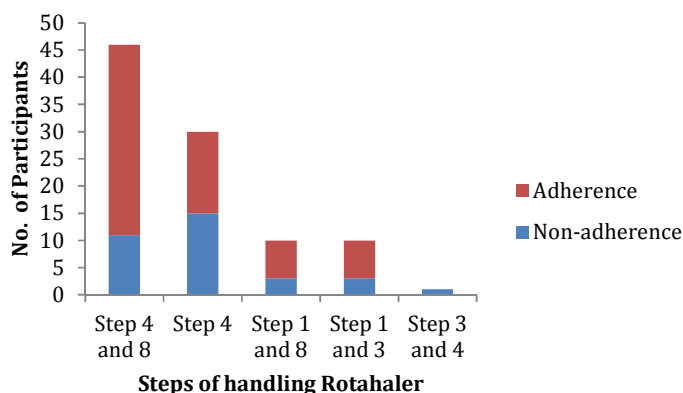
<b>Health experiences of the patients</b>	<b>n (%)</b>
Concerned about the side effects of medication	57 (34.8)
Medication difficult to handle physically	66 (40.2)
If yes, route of administration (n=66)	
Oral	6 (16.7)
Inhaler	60 (83.3)
Satisfied with the information shared by doctor or Pharmacist	149 (90.9)
Family support to cure disease	139 (84.8)
Financial difficulties limiting access to health care	56 (34.1)
Doctor spend adequate time	151 (92.1)
Management of illness disturbed life	157 (95.7)

**Table 5. Health behavior of the patients**

<b>Health behavior of the patients</b>	<b>n (%)</b>
Have strict routine for regular medications	97 (59.1)
Keep to be used medication close to them	160 (97.6)
Follow the instructions of doctors	153 (93.3)
Proper knowledge to use Inhaler/ Rotahaler	67 (40.9)
Do you wash the Rotahaler at least twice a week?	113 (68.9)
Do you always store the Inhaler/Rotahaler in its box?	106 (64.6)
Do you know that a new Rotahaler is to be used for only 6 months?	37 (22.6)
Those who use corticosteroids as inhaler, gargle mouth after using it	129 (78.7)
Change in the recommended management to suit lifestyle	146 (89.0)
Discontinue dose	77 (47.0)
If yes, reasons for discontinuation (n=77)	
Side Effects	17 (22.1)
Symptomatic Relief	33 (42.9)
Both	25 (32.5)
Lack Belief	2 (2.6)
Consult doctors about medical problems before taking any action	141 (86.0)

**Table 6. Association between medication adherence and health beliefs, experiences and behaviors of the patients**

<b>Characteristics</b>	<b>Adherence Level</b>	<b>n</b>	<b>Mean ± SD</b>	<b>p Value</b>
Health beliefs	Non-adherence	56	8.57±0.931	0.873
	Adherence	108	8.55±0.961	
Health experiences	Non-adherence	56	10.02±0.863	0.956
	Adherence	108	10.01±0.981	
Health behaviors	Non-adherence	56	17.38±3.267	0.025*
	Adherence	108	16.26±2.322	



**Fig. 4. Steps of handling rotahaler**

*Note: Steps of handling rotahaler: 1.Hold rotahaler vertically, 2. Put capsule into a square hole, 3.Rotate the base of the rotahaler to split capsule into cap and body part, 4.Breathe out fully, 5. Put the mouthpiece between lips and teeth and close lips tightly around it, 6. Tilt your head slightly backward and breathe in the powder quickly and deeply, 7.Take the mouthpiece out of the mouth, 8. Hold breathe for 10 seconds or as long as you are comfortable and breathe out normally*

Medication adherence was significantly associated with the health behaviors of the patients at  $p=0.025$ , as illustrated in Table 6.

#### 4. DISCUSSION

Our study evaluated the factors associated with medication adherence among chronic obstructive pulmonary disease patients in a tertiary care hospital in Nepal. Overall, the study population was mostly female and aged  $\geq 60$  years. Two-third of COPD patients were found to be adherent to their prescribed medication, and age, education, number of drugs and health behaviors of the patients were the most adherence influencing factors. A study in the capital city of Nepal had also reported a high level of medication adherence among COPD patients [11]. Medication adherence is an essential component to COPD management and better therapeutic effectiveness but previous studies had reported a high prevalence of poor medication adherence among Nepalese patients with COPD [6,14].

Our study showed medication adherence is statistically significant with sociodemographic (age, educational status) and clinical characteristics (No of daily drug use), which is consistent with previous findings [15,16]. In contrast to our finding several studies showed that there was no association between the level of adherence and sociodemographic and clinical variables [6,14,17,18]. This is because older patients are more likely to adhere to therapy. A study reported that the patients who had an

understanding of their illness adhere more to their COPD medications, while those with low understanding are likely to adhere less [6,19]. Treatment of COPD is based on the stage of the patient illness and in many cases, multiple medications are required for the treatment. Our findings suggested the prescription of drugs with a fixed-dose combination for medication-based management of COPD, as it will be more beneficial and easier for the patients to remember to take medications, which will subsequently enhance the quality of life of patients thereby providing desired therapeutic outcomes [15].

Our study showed that medication adherence was significantly associated with the health behaviors of the patients, while health beliefs and health experiences have no relationship with medication adherence. A study in Australia had reported that the patient's beliefs, experiences, and behaviors with regards to both disease and treatment were the most powerful predictors of medication adherence than socio-demographic and clinical factors in patients with COPD [19]. The increased adherence to medication seen in our study population might be due to proper counseling by the hospital pharmacist about the patient's illness, medication, and health behaviors.

There are some limitations to our study. It was a single centered study conducted in a single center of central Nepal and a relatively small sample size. Therefore, the generalizability of the findings remains to be explored. The validity of

research is solely based on the response given by the patients. Some of the participants may have answered positively to avoid a negative impression. However, our study provides various evidence regarding adherence patterns and factors influencing it in COPD.

## 5. CONCLUSION

Our study suggested that two-third of COPD patients were adherent to their medication, and age, education, number of drugs, and health behaviors of the patients were the most influencing factors of medication adherence. Our study has improved the understanding of factors associated with adherence to COPD, and their relationship. This understanding should help caregivers and participants to improve the clinical outcomes of COPD patients by addressing their medication-taking behavior.

## CONSENT AND ETHICAL APPROVAL

Ethical approval and clearance were obtained from the Institutional Review Committee (IRC) of Chitwan Medical College and Teaching Hospital (IRC/ 2045/075-34) and Institutional Review Committee (IRC) Pokhara University (PURC). Written informed consent was obtained from all patients before their involvement in the study, and all the information was kept confidential.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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