Research Article

Factors affecting medication adherence among chronic obstructive pulmonary disease patients attending at teaching Hospital, Chitwan

Shikshya Acharya, Kalpana Sharma

School of Nursing, Chitwan Medical College, Chitwan, Nepal

Correspondence to: Kalpana Sharma, E-mail: paudelkalpana@yahoo.com

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ABSTRACT

Background: Medication adherence is crucial for optimizing clinical outcomes in chronic obstructive pulmonary disease (COPD) patients because non-adherence possess significant burden in health and economy. Patients' medication adherence is influenced by numerous factors. **Objective:** The objective of this study was to identify the factors affecting medication adherence among COPD patients attending at teaching hospital, Chitwan. **Materials and Methods:** A descriptive cross-sectional study was carried out among 121 clinically diagnosed COPD patients attending at a teaching hospital, Chitwan. Non-probability purposive sampling technique was used to select patients for the study. Ethical approval was taken from Chitwan Medical College – Institutional Review Committee and informed consent was obtained from patients. Pre-tested semi-structured interview schedule and a standardized tool "Morisky Medication Adherence Scale, 2008" were used to gather the data by the researcher from November 16, 2016, to December 15, 2016. Bivariate and multinomial logistic regression analyses were performed to analyze the data. **Results:** Findings of the study revealed that out of 121 patients, 55.4% had medium level, 28.9% had a high level, and 15.7% had a low level of medication adherence. Bivariate analysis showed that patients' level of medication adherence was significantly associated with an understanding of disease condition from family members ($P = 0.03$), support from neighbors as needed ($P = 0.02$), having own monthly income ($P = 0.04$), and affordability of medication cost ($P = 0.02$). Multinomial logistic regression analysis identified that patients who can afford the cost of medication (odds ratio [OR]: 6.39, 95% confidence interval [CI]: 1.27–32.11), had family understanding about disease condition (OR: 11.18; 95% CI: 1.76–70.66), get support from neighbor as needed (OR: 11.92; 95% CI: 2.39–59.34), and had accessible to health facilities at <30 min distance (OR: 0.10; 95% CI: 0.02–0.55) were more likely to have high level of medication adherence. **Conclusion:** Only one-third of the COPD patients have a high level of medication adherence. Hence, local health-care planners need to organize the educational program on medication adherence for COPD patients by considering the notable factors to enhance their quality of life.

KEY WORDS: Medication Adherence; Chronic Obstructive Pulmonary Disease Patients; Factors

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing. The estimated global burden of COPD is 10.1% where 11.8% in male and 8.5% in female were present. Across the World Health Organization regions, the highest prevalence was estimated in the Americas (13.3% in 1990 and 15.2% in 2010) and the lowest in Southeast Asia (7.9% in 1990 and 9.7% in 2010).[1-3]

It is estimated that about 3 million people died of COPD in 2015, which is equal to 5% of all deaths globally that year. More than 90% of COPD deaths occur in low- and middle-income countries. COPD is predicted to be the third leading

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cause of death worldwide by 2030 due to an increase in tobacco use, exposures to combustion products of biomass fuels and environmental pollution.[4,5] Nepal is not far from COPD associated morbidity and mortality. A hospital-based study revealed that the prevalence of non-communicable diseases (NCDs) in non-specialist institutions of Nepal was 31%. Among them, COPD is the most common NCDs which account 43% of all NCDs cases.[6]

COPD is a non-curable chronic illness which impairs the quality of life of COPD patients in all aspects of life,[7] and it requires regular treatment to control symptoms, slows the progress of the disease, and improves the quality of life. Patients' adherence to prescribed treatment helps to reduce overall health-care expenditure, risk of hospitalization and deaths.[1,8-10] Non-adherence to medications is considered as one of the largest drug-related issues worldwide. Several studies have shown that COPD patients have poor adherence to their medications.[11-13] Patients' nonadherence to prescribed medical therapy can reduce treatment benefits and can obscure the clinician's assessment of therapeutic effectiveness. It is thought to account for 30%–50% of treatment failures.[14,15]

Various factors affect the medication adherence of COPD patients such as multiple morbidities, the medication, delivery devices, and the patient and health professionals caring for the patient. Evidence reported that smoking and 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.[9,16]

Many studies were conducted in developed and developing countries to assess the medication adherence pattern. However, only two studies were conducted in Kathmandu, Nepal especially on medication adherence and the associated factors affecting medication adherence. One study revealed that nearly two-third of the patients were non-adherence to medications and the common reasons for non-adherence to medications were an experience of side effects of drugs (63.3%), forgetfulness (52.3%) and polypharmacy.[17] Likewise, other study identified patient-prescriber communication, severity of symptoms, number of daily drugs, frequency of daily drugs, and medication cost as notable factors associated the medication adherence among COPD patients.[18] These two studies could not represent medication adherence of COPD patients all over the country because medication adherence and its influencing factors might get varied according to the nature of the population and different geographical distribution. Hence, this study was undertaken to explore the factors affecting medication adherence among COPD patients attending at teaching hospital, Chitwan for the better clinical outcomes which would ultimately aid to improve quality of life of COPD patients.

MATERIALS AND METHODS

A descriptive cross-sectional study design was used, and 121 clinically diagnosed COPD patients were selected purposively from the medical Outpatient Department (OPD) of Chitwan Medical College (CMC) Teaching Hospital. The study population consisted of patients aged 40 years and older, who were clinically diagnosed to have COPD for at least 3 months and attending at medicine OPD for follow-up visits. Before the data collection, an Ethical Clearance was taken from the CMC-Institutional Review Committee (CMC-IRC), and the administrative approval was obtained from the hospital authority of the selected hospital. A written informed consent was obtained from the patients with COPD. Permission and license of Morisky Medication Adherence Scale (MMAS) developed by Morisky in 2008 were obtained for the use in the study. Data were collected by the researcher herself from November 16, 2016 to December 15, 2016 using semi-structured interview schedule and eight items validated MMAS.

Data were entered into Epidata 3.1 and exported into SPSS version 17.0 for window for the analysis. Categorical variables have been described according to the number and percentage of subjects in each category, and continuous variables have been described using mean and standard deviation. Bivariate analysis (Chi-square test) was performed to determine the association between level of medication adherence and the predictor variables. The level of significance was set at 0.05 and 95% confidence interval. Multinomial logistic regression analysis was done to determine the strength of association between the significant factors and level of medication adherence. Those variables which are significant at 20% level of significance ($P < 0.20$) in bivariate analysis were modeled into the multinomial logistic regression analysis. Adherence was categorized into three levels: High, medium, and low. Low adherence was taken as the reference category for dependent variables. The odd ratio was calculated only for significant variables. Insignificant predictor variables were not studied for multinomial relationship.

RESULTS

A total of 121 patients with COPD were included in the study. The mean age of the patients was 71.0 years. More than half were female (57.9%), 71.1% came from municipality area, 99.2% were married, 64.5% were illiterate, and 72.7% of the patients were masons. The mean duration of COPD was 1.42 years (ranging from 6 months to 17.0 years). Nearly two-third (62.0%) of patients were receiving treatment for <5 years, 15.7% had experienced side effects of medicines, and very few (10.5%) patients had stopped medicines due to side effects. Likewise, more than half (53.7%) of the patients had comorbidity and the most common comorbid condition was hypertension (30.6%). Moreover, 19.0% of patients reported

Table 1: Patients' sociodemographic and clinical variables, *n*=121

Sociodemographic variables	*n* (%)	Clinical variables	*n* (%)
Mean age (SD) (years)	70.57±9.59	Mean duration of disease (years)	1.42±0.49
Gender		Duration of treatment	
Male	51 (42.1)	<5 years	75 (62.0)
Female	70 (57.9)	≥5 years	46 (38.0)
Residence		Experience of side effects of medicine	
VDC	35 (28.9)	Yes	19 (15.7)
Municipality	86 (71.1)	No	102 (84.3)
Marital status		Presence of co-morbidity	
Married	120 (99.2)	Yes	65 (53.7)
Unmarried	1 (0.8)	No	56 (46.3)
Education		Frequent changes in medication regimen	
Illiterate	78 (64.5)	Yes	23 (19.0)
Literate	43 (35.5)	No	98 (81.0)
Occupation		Current MRC dyspnea grading	
Home makers	88 (72.7)	Grade 1 and Grade 2	20 (16.5)
Agriculture	25 (20.7)	Grade 3	43 (35.5)
Service	2 (1.7)	Grade 4	52 (43.0)
Business	6 (5.0)	Grade 5	6 (5.0)

SD: Standard deviation

that their medication regimen was frequently changed by their physician. At present, more than 78.5% of patients were in Grade 3 and Grade 4 level of dyspnea [Table 1]. Nearly two-third (64.5%) patients had knowledge about the duration of treatment needed for COPD patients, 99.2% perceived the need of treatment, and 94.2% patients' perceived benefits of treatment to improve their condition (not shown in table).

Table 2 shows that more than half (55.4%) of the patients had a medium level of medication adherence and nearly one-third (28.9%) had a high level of medication adherence.

Table 3 indicates that high level of medication adherence was seen among those patients whose family had understanding of their disease condition, who got financial support from neighbors as needed, who had their own monthly income, compared to those whose family did not have understanding of their disease condition, who did not get financial support from neighbors as needed, and who did not have own monthly income. Similarly, the level of medication adherence was significantly associated with the affordability of medication cost (P = 0.02) where a higher number of patients who can afford for the medication cost had a medium level of medication adherence compared to those who cannot afford for their medication cost. However, there was no significant association between patients' level of medication adherence with attending social function and distance of health facility and information about medication by a physician.

Table 4 reveals that the patients who can afford the medication cost, whose family had understanding of disease condition, and who get support from neighbors as needed were more likely to have high and medium level of medication adherence compared to patients who cannot afford the medication cost, whose family did not have understanding of disease condition, and who did not get support from neighbors as needed. Similarly, patients who had the nearest health center at <30 min distance were more likely to have a moderate level of medication adherence compared to patients whose health facility is n 30 min distance. These models also controlled for having their own monthly income and taking medicine by inhalation, although they were not statistically significant. These model 1 and models 2 predicted 35% of the variance in medication adherence as explained by six independent variables included in the model construction.

Table 2: Patients' level of medication adherence

Level of adherence	Frequency (%)
Low adherence (<6)	19 (15.7)
Medium adherence (6–<8)	67 (55.4)
High adherence (=8)	35 (28.9)
Total	121 (100)

DISCUSSION

Medication adherence is important for COPD patients for the effectiveness of the therapy. Nearly one-third of COPD patients have a high level of medication adherence and the most influencing factors of medication adherence were family understanding of disease conditions, financial support from neighbors, and affordability of medication cost. These

Table 3: Association of patients' level of medication adherence with selected variables, *n*=121

Variables	Level of adherence			χ^2	*P* value
	Low	Medium	High		
	n (%)	*n* (%)	*n* (%)		
Understanding of disease condition from family members					
Yes	13 (12.3)	62 (58.5)	31 (29.2)	6.54	0.03*
No	6 (40.0)	5 (33.3)	4 (26.7)		
Financial support from neighbors as needed					
Yes	10 (10.6)	55 (58.5)	29 (30.9)	7.12	0.02
No	9 (33.3)	12 (44.4)	6 (22.2)		
Attending in social function					
Yes	13 (14.9)	50 (57.5)	24 (27.6)	0.55	0.75
No	6 (17.6)	17 (50.0)	11 (32.4)		
Having own monthly income					
Yes	12 (15.0)	39 (48.8)	29 (36.2)	6.32	0.04
No	7 (17.1)	28 (68.3)	6 (14.6)		
Distance of health facilities					
<30 min	11 (17.2)	40 (62.5)	13 (20.3)	4.92	0.08
≥30 min	8 (14.0)	27 (47.4)	22 (38.6)		
Affordability of medication cost					
Yes	8 (10.5)	49 (64.5)	19 (25.0)	7.6	0.02
No	11 (24.4)	18 (40.0)	16 (35.6)		
Information about medication by physician					
Yes	11 (16.7)	34 (51.5)	21 (31.8)	0.89	0.63
No	8 (14.5)	33 (60.0)	14 (25.5)		

*$P < 0.05$

Table 4: Factors affecting patients' medium and high level of medication adherence, *n*=121

Variables	Model 1: Medium adherence		Model 2: High adherence	
	Unadjusted	Adjusted	Unadjusted	Adjusted
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Having own monthly income (yes-1, no-0)	0.81 (0.28–2.32)	1 (0.28–3.48)	2.81 (0.78–10.15)	3.5 (0.83–14.78)
Taking medicine by inhalation (yes-1, no-0)	1.6 (0.37–6.92)	1 (0.18–5.36)	6.37 (0.61–66.17)	4.5 (0.38–52.37)
Affordability of medication cost (yes-1, no-0)	3.74 (1.29–10.79)	10.85 (2.37–49.72)	1.63 (0.52–5.04)	6.39 (1.27– 32.11)
Understanding of disease condition From family members (yes-1, no-0)	5.72 (1.51–21.61)	16.19 (3.00–87.28)	3.57 (0.86–14.81)	11.18 (1.76–70.66)
Support from neighbors as needed (yes-1, no-1)	4.12 (1.37–12.34)	13.05 (2.99–57.00)	4.35 (1.23–15.31)	11.92 (2.39–59.34)
Distance of health facilities (<30 min-1, ≥30 min-0)	1.07 (0.38–3.02)	0.22 (0.05–1.06)	0.43 (0.13–1.34)	0.1 (0.02–0.55)

Reference category in Model 1 and Model 2: Low adherence. R^2: Value of cox and snell: 0.30 and Nagelkerke: 0.35

variables explained 35% of the variance in medication adherence among COPD patients.

Our finding revealed that 28.9% of COPD patients had a high level of medication, more than half (55.4%) of patients had a medium level of medication adherence, and 15.7% had a low level of adherence whereas other studies in Nepal[18] and Taiwan[19] showed a high level of adherence to COPD medication among patients. The author in the United Kingdom[20] suggested that intentional non-compliance with medication is low among COPD patients due to their persistent symptoms and fear of exacerbations.

However, other studies[9,17,21-23] showed low level of medication adherence. This discrepancy in findings may be due to the difference in knowledge regarding COPD among participants, use of different measurement tool and inclusion of different groups of the sample population in the study.

In our study, we found the significant association between level of medication adherence and understanding of disease conditions from family members and financial support from neighbors as needed. Consistent with this, a study in India revealed that the reasons for non-adherence to medications were lack of family support and fear of dependence on medication.[24] However, other study in Nepal reported less medication adherence among patients receiving family/ social supports than those who were self-concerned about the disease.[17] This divergence in findings might be due to the difference in the knowledge of patients to use an inhaler, and settings of the study. Research evidence[25] reported that the patients who had an understanding about their illness adhere to their COPD medications and poor adherence was present among patients who had less understanding of their illness because they believed that the disease was incurable and had less belief on the prescribed medications.[17]

The present study found that there was a significant association between the affordability of medication cost and patients' level of medication adherence, i.e., those patients who can afford the medication cost had a significantly higher level of medium adherence as compared to those who cannot afford for their medication. This finding is consistent with the finding of a study in Nepal which found the significant association between the level of medication adherence and medicine cost.[18] However, other studies[17,21] found that medication adherence was not associated with the cost of COPD medications paid by the patients. Moreover, the study reported that better treatment adherence yield reductions in health-care utilization and cost.[26]

In this study, none of the variables related to sociodemographic information (such as age, gender, place of residence, educational status, type of occupation, and smoking habit), clinical variables (i.e., route of administration, prescribed medicines per day, side effects of medication, smoking habit, knowledge about treatment and perceived benefit of treatment, comorbidity, and severity of symptoms) were associated with patients' level of medication adherence. Consistent to these findings, studies conducted in Nepal,[18] Northern Ireland,[27] and Poland[28] showed that there was no association between level of adherence with sociodemographic and clinical variables (age, gender, marital status, place of residence, education, type of occupation and current smoking status, and severity of COPD). However, these findings are contradictory with other studies in which medication adherence was associated with age,[21] current smoking status,[21,27] comorbidity, number of medications consumed,[19] severity of symptoms,[16,18,27] and frequency of daily dosing frequency,[26] and daily drug dosages.[18] The difference in findings might be due to the inclusion of a sample of different duration of disease, different study settings and use of different validated instruments in the studies.

Our study showed that more than half (54.5%) of patients received information about medication by their physician which is lower than the findings of the study done in Kathmandu Nepal in which 83% of patients received explanation about the regularity of taking medicine by their health-care provider and 89% of patients were explained about when and how to take those medicines.[18] Moreover, our study found that the patients' level of medication adherence was not significantly associated with the information about the medication provided by their physician. However, this finding is contradicted with the other study in Nepal which showed that there is a positive association of medication adherence with patient prescriber's communication. Moreover, the study reported that there is a significant association between the repeated instructions about therapy and overall adherence mean score.[18] This discrepancy in findings might be due to different study settings.

Factors affecting medication adherence were explored through multi-nominal logistic regression analysis in the Nepalese population which is the strength of this study. The limitations of this study include: This is a cross-sectional study; hence, it cannot determine the casual relationship between the variables. Likewise, the study population was OPD attended patients in only one setting so the findings of the study cannot be generalized to the entire population.

CONCLUSION

Findings of the study showed that nearly one-third of the COPD patients' have a high level of medication adherence. Understanding of disease condition from family members, support from neighbors as needed and affordability of medication cost are the factors which influence the medication adherence of COPD patients. Patients who can afford the medication cost, have a family understanding about disease condition, and get support from neighbor as needed have a high level of medication adherence. Moreover, patients who have own monthly income and have accessibility to a health facility at <30 min have higher medication adherence. Hence, health workers and local health planners need to provide their attention to medication adherence including notable factors while planning health services to the COPD patients.

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