Nonadherence to treatment and quality of life among patients with chronic obstructive pulmonary disease

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ABSTRACT

Objectives: Chronic obstructive pulmonary disease (COPD) is one of the most common respiratory diseases. Assessment of medication nonadherence and quality of life (QOL) is important in such chronic diseases. The aim of the study was to describe treatment nonadherence and QOL of COPD patients and their associated factors. Materials and Methods: A cross-sectional study was performed in Mansoura Chest Hospital on 133 already diagnosed inpatient cases of COPD from March to August 2017. Data were collected using two validated questionnaires, Morisky Medication Adherence Scale to assess medication adherence and St George’s Respiratory Questionnaire for COPD patients (SGRQ-c) to assess QOL. Results: About 45% of studied group were nonadherent to prescribed medications. Logistic regression analysis showed that duration of disease is the only independent risk factor for nonadherence. The scores on SGRQ-c indicated severe QOL affection in COPD. SGRQ-c scores show significant impairment with the presence of comorbidities, hospital admission, and frequency of exacerbations. Conclusions: Nonadherence to treatment was affected mainly by the duration of disease. QOL impairment in COPD is influenced by broad range of factors suggesting the importance of QOL assessment in those patients. No association was found between nonadherence to treatment and QOL.

KEY WORDS: Chronic obstructive pulmonary disease, Morisky Medication Adherence Scale, St George’s Respiratory Questionnaire for chronic obstructive pulmonary disease

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the most common respiratory illnesses in the world.[1] In 2016, COPD was the fourth leading cause of death in middle-income countries[2] and it is predicted that COPD will be the third leading cause of death by 2030.[3] In North Africa and Middle East, COPD prevalence was about 3.6%.[4] In Egypt, it was estimated that COPD prevalence among high risk groups was 10%.[5]

Adherence to treatment can be broadly defined as “the extent to which a person’s behavior corresponds with the agreed recommendations from a health-care provider.”[6] COPD is a chronic disease that typically necessitates the regular use of pharmacotherapies.[7,8] Nonadherence rate in COPD has been estimated to be more than 50%.[9] Poor adherence in COPD is influenced by many factors related to the patients, the illness, the prescribed medications, the society, and the health system.[10]

Quality of life (QOL) is an important domain of measuring the impact of chronic disease.[11] It includes physical, emotional, and social aspects of health and well-being, and it is a measure used to understand the health status...
COPD markedly affect patients' QOL due to physical, social, and free time activity limitation. Worse QOL in COPD is associated with many factors such as sex, severity of disease, smoking status, presence of comorbidities, number of exacerbations, and hospital admissions. To the best of the authors knowledge, there is a dearth of information about nonadherence and QOL in COPD in Egypt. Therefore, studying nonadherence and QOL among COPD patients will be helpful to health-care providers and policy makers. In the present study, we aim to describe treatment nonadherence and QOL of COPD patients and their associated factors.

MATERIALS AND METHODS

A cross-sectional hospital-based study was carried out in Mansoura Chest Hospital (a major referral hospital in Dakhilia, Egypt) on inpatients of COPD from March to August 2017. The Institution Research Board of Faculty of Medicine, Mansoura University, approved the study protocol. Informed written consent from each participant in the study was obtained. COPD patients with at least 1-year duration were included in the study. Other inclusion criteria involved COPD diagnosis confirmed by a chest consultant. Severe cases who are not alert to answer the questionnaire, those having dementia, or those having any mental problems were excluded.

Target population

COPD patients with at least 1-year duration were included in the study. Other inclusion criteria involved COPD diagnosis confirmed by a chest consultant. Severe cases who are not alert to answer the questionnaire, those having dementia, or those having any mental problems were excluded.

Study tools

A questionnaire was used to collect demographic data (e.g., age, sex, education, and occupation), medical data (e.g., presence of comorbidities, hospital admission, and frequency of exacerbations), adherence to treatment, and QOL scores.

Morisky Medication Adherence Scale

It is a generic, validated (alpha reliability = 0.61) medication taking behavior scale. Morisky Medication Adherence Scale (MMAS) was used to measure the patient adherence to treatment over the 4 weeks preceding their clinical visit. This scale measures adherence through four yes/no response items: forgetting, carelessness, stopping medication when feeling better, and stopping medication when feeling worse. The MMAS four items are given a scoring scheme of "Yes = 0" and "No = 1." The items are summed and adherence was graded; scores 0–1 were considered nonadherent.

St George’s Respiratory Questionnaire for chronic obstructive pulmonary disease patients

St George’s Respiratory Questionnaire for COPD patients (SGRQ-c) Arabic version was used. It is a disease-specific, validated questionnaire developed by Jones and translated into Arabic and validated by Metwally. The questionnaire consists of forty items (33 items of the questionnaire are dichotomous while Likert scale was used in 7 items of the questionnaire). Each item in the questionnaire has item weight. Item weights range from 0 (the lowest item weight) to 100 (the highest item weight).

The questionnaire has three components: symptom component which consists of questions 1–7 which is part 1 of the questionnaire; activity component that is present in part 2 of the questionnaire and consists of questions 9 and 12; and the rest of the questions in part 2 of the questionnaire represent the impact component.

The score was calculated as follows:

a. Calculating score of each component:

\[
\text{Summed weights from all positive responses in that component} \times 100
\]

\[
\frac{\text{Sum of maximum possible weights for all items in that component}}{100}
\]

b. Calculating total score:

\[
\text{Summed weights from all positive items in the questionnaire} \times 100
\]

\[
\frac{\text{Sum of maximum possible weights for all items in the questionnaire}}{100}
\]

For each component and total, sum of maximum possible weights is 566.2 for symptom, 982.9 for activity, and 1652.8 for impact components, and the total (sum of maximum for all three components) is 3201.9.

(Note: These are the maximum possible weights that could be obtained for the poorest possible condition of the patient as higher score indicates worse QOL).

Statistical analysis

The collected data were coded, processed, and analyzed using SPSS (Version 17, SPSS Inc., Chicago, IL) for Windows. Categorical variables were described according to number and percentage of participants in each category, and nonnormally distributed continuous variables were described as median (min-max). Before inferential analysis, test of normality (Shapiro–Wilk) was conducted to assess the normality of QOL scores. The data were not normally distributed; therefore, to test the significance of continuous data, nonparametric tests were used (Mann–Whitney [Z] test to compare two unpaired groups and Kruskal–Wallis test to compare three or more groups). Whereas, Chi-square test was used to test the significance of categorical data. Odds ratio (OR) with 95% confidence interval (CI) were calculated. Significant variables in univariate analysis were included in binary stepwise logistic regression model using Forward Wald method. \( P \leq 0.05 \) was considered statistically significant.

RESULTS

The demographic and medical characteristics of studied patients are shown in Table 1. Of the 133 studied
patients, there were 60 patients (45.1%) nonadherent to prescribed medications. Significant independent variables by univariate analysis (sex, comorbidities, and duration of disease) were included in multivariate logistic regression analysis. The only independent risk factor for nonadherence by regression analysis was duration of disease (OR = 2.8, P = 0.005).

The mean SGRQ-c total, symptom, impact, and activity component QOL scores were 66.6 ± 18.71, 66.39 ± 20.15, 60.86 ± 22.87, and 76.35 ± 21.06, respectively, where the activity component score was the most affected as it is the highest score. Patients with comorbidities had worse QOL than patients without comorbidities (P = 0.03). QOL scores were worse among patients with a history of hospital admission than patients without a history of hospital admission (P ≤ 0.001). Patients with more frequent exacerbations had lower QOL compared to patients with less frequent exacerbations (P ≤ 0.001) [Table 2].

**DISCUSSION**

Nonadherence to treatment is a major problem in COPD. The present study confirmed poor adherence to medications in COPD patients. Nonadherence to medications in 45.1% of studied patients is consistent with the result of earlier studies which assessed medication adherence using self-reported methods. However, this result is far away from Galal et al.’s study who found that nonadherence was 93% among COPD patients. Patients recruited from the inpatient setting in our study may be the cause of this discrepancy. It seems that hospitalized patients adhere to treatment more precisely.

In the current study, nonadherent patients had short duration of disease compared to adherent patients. This is inconsistent with Devonshire et al. who found significant association between long duration of disease and nonadherence in patients with multiple sclerosis and attributed this finding to more exposure to factors limiting medication adherence with long duration of disease.

Despite significant association between female sex and nonadherence, patient’s sex was not a predictor of nonadherence in final regression model. This is in agreement with evidence provided by previous studies. However, group difference between males and females was reported in previous literature.

**Table 1: Bivariate and multivariate logistic regression analysis of factors associated with nonadherence**

| Variables                      | Total, n (%) | Nonadherent, n (%) | Bivariate analysis | Logistic regression analysis |
|--------------------------------|--------------|--------------------|--------------------|----------------------------|
|                                |              |                    | P  | COR (95%CI) | P  | AOR | CRI: Crude odds ratio, AOR: Adjusted odds ratio, r: Reference group, COPD: Chronic obstructive pulmonary disease, CI: Confidence interval

**Overall**

| Variables                      | n (%) | Nonadherent, n (%) |  | COR (95%CI) |  | AOR |
|--------------------------------|-------|--------------------|  |            |  |     |
| Overall                        | 133   | 60 (45.1)          | - | -          | - | -   |

| Variables                      | n (%) | Nonadherent, n (%) |  | COR (95%CI) |  | AOR |
|--------------------------------|-------|--------------------|  |            |  |     |
| Age (years) ≤60                | 54    | 27 (50)            | 0.4 | 1.4 (0.7–2.8) |  | -   |
| >60                            | 79    | 33 (41.8)          | 1  | -          | - | -   |

| Sex                            |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Male                           | 111   | 45 (40.5)          | 0.017 | 1          | - | -   |
| Female                         | 22    | 15 (68.2)          | 3.1 (1.12–8.3) | - | - | -   |

| Educational status             |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Literate                       | 71    | 28 (45.2)          | 0.9 | 1 (0.5–1.9) | - | -   |
| Illiterate                     | 62    | 32 (45.1)          | 1  | -          | - | -   |

| Occupation                     |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Homemaker                      | 14    | 11 (71.4)          | 0.06 | 3.9 (0.8–17.5) | - | -   |
| Farmer                         | 26    | 12 (46.2)          | 0.6 | 1.3 (0.4–4.6) | - | -   |
| Manual worker                  | 75    | 31 (41.3)          | 0.8 | 1.1 (0.4–3.2) | - | -   |
| Professional or semiprofessional | 18  | 7 (38.9)          | 1  | -          | - | -   |

| Duration of COPD (years) ≤10   | 70    | 40 (57.1)          | 0.003 | 2.9 (1.4–5.8) | 0.005 | 2.8 (1.4–5.8) |
| >10                            | 63    | 20 (31.7)          | 1  | -          | - | -   |

| Smoking habit                  |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Smoker                         | 35    | 15 (42.9)          | 1  | -          | - | -   |
| Ex-smoker                      | 61    | 25 (41)            | 0.9 | 0.9 (0.4–2.1) | - | -   |
| Nonsmoker                      | 37    | 20 (54.1)          | 0.3 | 1.6 (0.6–3.9) | - | -   |

| Comorbidity                    |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Absent                         | 86    | 33 (38.4)          | 0.04 | 1          | - | -   |
| Present                        | 47    | 27 (57.4)          | 2.2 (1.1–4.5) | - | - | -   |

| Hospital admission             |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| Absent                         | 116   | 11 (64.7)          | 0.08 | 2.5 (0.9–7.2) | - | -   |
| Present                        | 17    | 4 (23.5)           | 1  | -          | - | -   |

| Exacerbation number            |       |                    |  |            |  |     |
|--------------------------------|-------|--------------------|  |            |  |     |
| ≥3                             | 54    | 25 (46.3)          | 1  | -          | - | -   |
| 1–2                            | 62    | 24 (38.7)          | 0.4 | 0.7 (0.4–1.5) | - | -   |
| None                           | 17    | 11 (64.7)          | 0.18 | 2.1 (0.7–6.6) | - | -   |
The possible reason for this is that females are more likely than males to be preoccupied with children and families. In fact, caring for dependents is associated with lower medication adherence. Furthermore, multivariate analysis failed to find significant association between nonadherence and comorbidities. This is inconsistent with previous studies that have suggested that comorbidities are one of the greatest barriers to achieve medication adherence.

QOL in COPD show significant impairment. In the current study, COPD patients perceive low QOL with symptom and activity components were the most affected. Indeed, the low exercise tolerance has been confirmed in COPD patients and the interest of pulmonary rehabilitation in COPD patients has already been verified. On comparing these findings with related literature, it was found that QOL scores vary across countries with lower QOL among Egyptian COPD patients compared to their counterparts. Jones et al. attributed this discrepancy to variations in characteristics of studied patients (e.g. age, sex, smoking habits, and frequency of exacerbations) between countries.

Obviously, more patient hospitalizations usually indicate disease severity. Hence, it is predicted that patients with repeated hospital admission had worse QOL. The current study confirm adverse effect of hospital admission on QOL in COPD patients. This is consistent with findings of earlier studies in different countries. Jones et al. attributed this discrepancy to variations in characteristics of studied patients (e.g. age, sex, smoking habits, and frequency of exacerbations) between countries.

| Variables | Total | QOL scores, median (minimum–maximum) | Test of significance |
|-----------|-------|--------------------------------------|---------------------|
| Overall   | 133 (100) | 66.33 (15.52–98.06) |                     |
| Age (years) |               |                                    |                     |
| ≤60       | 54 (40.6)  | 61.43 (33.6–98.0) | Z=0.89              |
| >60       | 79 (59.4)  | 68.86 (15.5–97.6) | P=0.37              |
| Sex       |               |                                    |                     |
| Male      | 111 (83.5) | 64.8 (15.5–98.0) | Z=1.6               |
| Female    | 22 (16.5)  | 76.9 (36.5–97.6) | P=0.11              |
| Educational status |               |                                    |                     |
| Literate  | 71 (53.4)  | 64.12 (15.5–98.0) | Z=0.87              |
| Illiterate| 62 (46.6)  | 67.29 (36.5–98.0) | P=0.39              |
| Occupation|               |                                    |                     |
| Homemaker | 14 (10.5)  | 78.14 (36.51–97.67) | KW=2.1             |
| Farmer    | 26 (19.5)  | 67.16 (38.30–91.99) | P=0.55             |
| Manual worker | 75 (56.4) | 63.57 (15.52–98.06) |                 |
| Professional or semiprofessional | 18 (13.5) | 67.01 (33.67–97.15) |                 |
| Duration of COPD (years) |       |                                    |                     |
| ≤10       | 70 (52.6)  | 70.55 (15.52–98.06) | Z=1.69              |
| >10       | 63 (47.4)  | 60.60 (33.67–97.10) | P=0.09              |
| Smoking habit |             |                                    |                     |
| Smoker    | 35 (26.3)  | 67.29 (15.52–97.15) | KW=2.52             |
| Ex-smoker | 61 (45.9)  | 61.41 (37.13–98.06) | P=0.28              |
| Nonsmoker | 37 (27.8)  | 76.05 (33.67–98.06) |                 |
| Comorbidity|             |                                    |                     |
| Absent    | 86 (64.7)  | 63.57 (15.52–95.87) | Z=2.13              |
| Present   | 47 (35.3)  | 70.03 (39.34–98.06) | P=0.033             |
| Hospital admission |       |                                    |                     |
| Absent    | 116 (87.2) | 47.43 (15.52–67.29) | Z=4.19              |
| Present   | 17 (12.8)  | 70.48 (36.51–98.06) | P<0.001             |
| Exacerbation number |   |                                    |                     |
| ≥3        | 54 (40.6)  | 81.18 (40.39–98.06)*,† | KW=35.82         |
| 1–2       | 62 (46.6)  | 60.08 (36.51–97.15)*,‡ | P≤0.001           |
| None      | 17 (12.8)  | 47.43 (15.52–67.29) |‡‡                   |
| Adherence to treatment |     |                                    |                     |
| Adherent  | 73 (54.9)  | 66.33 (33.67–98.06) | Z=0.36              |
| Nonadherent| 60 (45.1) | 66.49 (15.52–97.67) | P=0.71              |

*Statistical significance was defined as P≤0.05. *,†,‡ Mean significant difference between corresponding groups by multiple comparisons.
Z: Mann–Whitney test, KW: Kruskal–Wallis test, COPD: Chronic obstructive pulmonary disease, QOL: Quality of life
The relationship between nonadherence and QOL is complex and poorly understood. The results showed no significant association between nonadherence and total QOL in agreement with other studies.\cite{40,41} Van Boven et al.\cite{40} explained this by the fact that the better QOL, the less the patient is triggered to adhere to treatment. Furthermore, better adherence requires lifestyle adjustment that has negative effect on immediate perceived QOL which covers the benefit of decreased hospitalization later on.

The present study has some limitations, one is that evidence from a cross-sectional study cannot demonstrate causal relationships compared to clinical trials which provide evidence from daily life practice and its results are more reliable. Furthermore, the sample was recruited from a major hospital in Egypt, and the generalizability of the findings in other cultures and other samples of COPD patients is limited. Furthermore, some factors that could affect data interpretation were not addressed in our study as psychological status and disease severity.

**CONCLUSIONS**

Medication nonadherence in COPD was affected mainly by the duration of disease. QOL impairment in COPD is influenced by the presence of comorbidities, hospital admission, and frequent exacerbations. No association was found between nonadherence to treatment and QOL. Evaluating COPD patients should include assessing medication adherence and QOL. More efforts must be directed to decrease hospital admission and to decrease exacerbations with special attention to patients with comorbidities. Future studies should address most cost-effective interventions to improve patient QOL and adherence to treatment.

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**Conflicts of interest**

There are no conflicts of interest.

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