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## Original Research Article

# A study on drug adherence in adults with obstructive airway diseases and its correlation with socio-economic status and gender in a semi-urban multi-specialty hospital

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## ABSTRACT

**Background:** To effectively treat obstructive airway disorders (OADs), including bronchial asthma and chronic obstructive pulmonary disease (COPD), medication adherence is essential. Although there is little information on adherence habits in Indian semi-urban areas, poor adherence can lead to suboptimal outcomes

**Primary:** To find the level of medication adherence in adults with Obstructive Airway Diseases & to find the association between medication adherence in adults with Obstructive Airway Diseases and their Socio-economic status and gender.

**Secondary:** To assess the difference in drug adherence between single and multiple inhaler therapy.

**Materials and Methods:** A Cross-sectional study is performed in MGM Muthoot Medical Centre, Pathanamthitta among 100 participants diagnosed with obstructive airway diseases (OADs). Data regarding adherence will be collected using Morisky's Medication Adherence Scale (MMAS-8) and SES by Modified Kuppaswamy's scale. Statistical analysis taken with the help of Chi-square tests, and  $p < 0.05$  is considered to be significant.

**Results:** Among the population of patients, 49% had reported low adherence, 28% medium, and 23% high adherence. SES was significantly associated with adherence ( $p < 0.05$ ) as lower SES groups showed lower adherence. Gender and type of inhaler therapy did not impact adherence significantly.

**Conclusion:** Socio-economic disparities enormously impact drug adherence among OADs. Therefore, the intervention focused on the lower SES becomes very important.

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## 1. Introduction

Respiratory diseases manifest as cough and dyspnoea and are broadly divided into obstructive lung diseases, restrictive disorders, and vascular abnormalities. Among these obstructive lung diseases are the most common and

primarily disorders of the airways.<sup>1</sup> This group includes bronchial asthma, COPD (emphysema, chronic bronchitis) and bronchiectasis. All these disorders have various clinical features but overlapping symptoms are common,<sup>2</sup> which makes diagnosis and management complicated.

COPD is a heterogeneous lung condition characterized by chronic respiratory symptoms due to abnormalities of airways &/or alveoli that cause persistent, often progressive

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airflow limitation.<sup>3</sup> This condition is associated with exacerbations that cause impaired health-related quality of life.<sup>4</sup> According to the World Health Organization, the organization predicts COPD will become the third leading cause of death globally by 2030, which puts a necessity for proper management strategies to avoid such a scenario.<sup>5</sup>

Asthma is an important chronic inflammatory airway disease affecting more than 300 million people worldwide. Its prevalence is steadily increasing in developing nations, including India.<sup>6</sup> Adherence refers to the degree a patient's actions reflect recommended medical recommendations and is key for appropriate disease self-management.<sup>7</sup> According to various research findings, even though taking drugs correctly plays a most significant role in the handling of chronic respiratory diseases; up to 50% of patients suffering from any chronic conditions are reported as non-adhering to their prescribes.<sup>8</sup> There are lots of barriers to adherence arising from low knowledge of illness, socio-economic factors or even improper use of the inhaler.

Nonadherence to prescribed therapies is a serious challenge and thus increases morbidity, the use of healthcare, and mortality.<sup>9</sup>

In our study conducted at MGM Muthoot Medical Centre, we are trying to find out the level of drug adherence among adults diagnosed with obstructive airway diseases in a semi-urban setting. We hope to identify some potential interventions that may improve treatment compliance and then eventually lead to better outcomes for patients through association between adherence levels and socio-economic status and gender.

## 2. Aim & Objectives

### 2.1. Aim

To study the drug adherence in adults with Obstructive Airway Diseases and its association with Socio-economic status and Gender, visiting a multi-specialty hospital in a semi-urban set up.

### 2.2. Primary objectives

1. To find the level of drug adherence in adults with Obstructive Airway Diseases.
2. To find the association between medication adherence in adults with obstructive airway disease and their socio-economic status and gender.

### 2.3. Secondary objectives

1. To assess the difference in drug adherence between single and multiple inhaler therapy.

## 3. Materials and Methods

### 3.1. Study area

The present study was conducted at the Department of Pulmonology/ Internal Medicine, MGM Muthoot Medical Centre, Pathanamthitta.

#### 3.1.1. Inclusion criteria

1. Aged 18 years or older, diagnosed with chronic obstructive pulmonary disease or bronchial asthma.
2. Patients receiving more than three months of treatment.
3. Informed consent by participants.

#### 3.1.2. Exclusion criteria

1. Patients with suspected or confirmed tuberculosis.
2. Below 18 years old.
3. Patients suffering from psychiatric or intellectual disorders.
4. First-time patients with no prior history of treatment for COPD or bronchial asthma.

### 3.2. Study duration

It covers a period of 18 months that is November 2017 to April 2019.

### 3.3. Study design

A cross-sectional, observational study is undertaken, using a structured questionnaire and collecting direct primary data related to drug adherence and socio-demographic factors.

### 3.4. Sample size

The sample size was drawn by the formula<sup>10</sup>

$$n = \frac{(Z_{1-\alpha/2})^2 p (1-p)}{d^2}$$

Where, n is the Sample Size

(1- $\alpha$ /2) – Confidence level

Z<sub>1- $\alpha$ /2</sub> – 1.96 at 5% level of significance

p – Incidence of desired variable of interest

d – Allowable error

Sample size was calculated to be 87 OAD cases using low adherence at 65%, confidence level of 95%, and allowable error at 10%.

### 3.5. Data collection

Data collection was done through outpatient visits or hospital admissions using a standardized data collection form. It included collection of demographic information, clinical diagnosis, details regarding drugs, and socioeconomic status, which was scored using the Modified Kuppaswamy's Grading System.<sup>11</sup> Adherence to drugs was accessed using Morisky's Medication Adherence Scale (MMAS-8).<sup>12</sup>

### 3.6. Outcome measurements

#### 3.6.1. Primary outcome

1. Levels of adherence of patients with OADs to drugs.
2. Relationship between adherence to drug therapy, socio-economic status and gender.

#### 3.6.2. Secondary outcome

Comparison of adherence between single and multiple inhaler therapies.

### 3.7. Statistical analysis

All the data collected has been entered into MS Excel and statistically analysed. All qualitative data have been reported in frequency and percent. Association between level of adherence and socio-economic status, gender and polypharmacy has been analysed through Chi-square test. A 'p' value of less than 0.05 is taken to be statistically significant.

### 3.8. Ethical considerations

The study was approved by the Institutional Ethics Committee of MGM Muthoot Medical Centre. IEC number: 01/12/2017. Written informed consent was obtained from all participants before enrolment

## 4. Observation & Results

### 4.1. Factors influencing drug adherence

#### 4.1.1. Socio-economic status

There was a very high correlation of SES with drug adherence levels. Lower adherence was more predominant among the lower socio-economic categories,  $p = 0.007$ .

#### 4.2. Gender and age

There was no gender,  $p = 0.249$ , or age,  $p = 0.375$ , correlation with adherence levels.

Smoking: There was no significant impact on adherence: ( $p = 0.299$ ).

Number of Inhalers: Patients on single inhaler therapy had a higher proportion of low adherence in comparison to patients on dual inhaler therapy, though not statistical-significant ( $p = 0.38$ ).

Duration of treatment: More subjects receiving long-term treatment  $\geq 30$  years reported lower adherence. Still, this was not statistically significant at  $p = 0.172$ .

## 5. Discussion

The aims of this study involve determining levels of drug adherence for adults diagnosed with OAD and attempting to identify associations between the adherence levels and socio-demographic factors such as SES and gender.

Differences in adherence between patients using single inhaler and multiple inhaler therapies were also to be measured.

### 5.1. Socio-demographic profiles

Our results reveal that the age range for majority of the participants was over 60 years while the mean age was 65.6 years. This, therefore, means increased prevalence of respiratory diseases among the elderly. Participants were further classified by the smoking status. Where in 43% of participants confirmed to be smokers and 30% reported exposure to passive smoking and all these are confirmed risk factors for the causation and exacerbation of OADs.

Nearly 70% of all the respondents fell in the Middle SES category (Lower-middle class or Upper-middle class).

### 5.2. Clinical characteristic

The investigation found that 65% were diagnosed with COPD, while the rest was bronchial asthma. 60% of them have been admitted to one or more hospitals in their treatment period. The treatment periods varied by quite a wide margin between 1 to 40 years. About 38% had been in treatment for over 10 years.

Mohsen et al<sup>13</sup> concluded his study that the duration of the disease has affected the treatment nonadherence. Cramer et al<sup>14</sup> in his study said that it is a fact that the patient treatment persistence was low for long term treatment.

### 5.3. Drug adherence levels

We used the Morisky Medication Adherence Scale (MMAS) and found that 49% of respondents had low adherence, while only 23% of respondents had high adherence. These results are not dissimilar to other studies in the literature; for example, Montes de Oca et al,<sup>15</sup> reported similar adherence rates of COPD patients. While a study conducted by Humenberger et al<sup>16</sup> ended with 33.6% complete adherence to inhaled therapy.

In another study by Galal et al,<sup>17</sup> they found that in asthma and COPD, low adherence was 71.7 and 79.4%, medium adherence in 19.8 and 13.6%, and high adherence in 8.4 and 7.1%, respectively.

To et al<sup>18</sup> conducted a study and reported that 40.0% showed a high degree of adherence with the inhalation therapy, 25.0% patients belonged to a risk group of nonadherence, i.e., "at medium level," and 35.0% low level of adherence.

Our study's findings related to reasons for non-adherence, such as felt better so stopped and forgetting medications, concur with previous research that identifies patient-related beliefs and behaviors as one of the biggest barriers to adherence.

**Table 1:** Demographic and clinical characteristics

Variable	Frequency (n=100)			Percentage (%)		
	Gender	Male: 62	Female: 38		Male: 62%	Female: 38%
Socio-economic Status	Low: 45	Middle: 39	High: 16	Low:45%	Middle:39%	High:16%
Smoking Status	Smokers: 44		Non-smokers:56	Smokers: 44%		Non-smokers:56%
Inhaler Therapy	Single: 77		Dual: 23	Single: 77%		Dual: 23%

**Table 2:** Adherence levels

Adherence Level	Frequency (n=100)	Percentage (%)
Low	49	49%
Medium	28	28%
High	23	23%

**Table 3:** Association between Drug adherence level and Socio-economic status

SES	Drug Adherence Level			Total
	Low	Medium	High	
Upper-Lower	12 (66.7%)	3 (16.7%)	3 (16.3%)	18
Lower-Middle	21 (70.0%)	6 (20.0%)	3 (10.0%)	30
Upper-Middle	13 (32.5%)	16 (40.0%)	11 (27.5%)	40
Upper	3 (25.0%)	3 (25.50%)	6 (50.0%)	12
Total	49	28	23	100

**Table 4:** Drug adherence level: Relationship between drug adherence level and gender.

Gender	Low	Medium	High	Total
Male	22 (44.0%)	13 (26.0%)	15 (30.0%)	50
Female	27 (54.0%)	15 (30.0%)	8 (16.0%)	50
Total	49	28	23	100

#### 5.4. Association with socio-economic status

One of the most striking findings from our research was that SES classes strongly correlated with adherence levels whereby the lower classes had poor adherence levels ( $p=0.007$ ). This is supported by Tøttenborg et al studies indicating that disposable income is of importance for adherence to drug.<sup>19</sup>

Some have argued that, on the contrary, better educational levels may lead to an even poorer prognosis since they rely on their judgment instead of following the regimens prescribed, as for instance was indicated in a Danish follow-up study by Ingebrigtsen et al.<sup>20</sup> This complexity underlines the demand for using tailored interventions with consideration of individual socio-economic circumstances.

#### 5.5. Gender and drug adherence

Our study did not find an association between gender and levels of drug adherence ( $p=0.249$ ). This is in line with several studies that have equally agreed on the fact that no serious impact of gender on medication adherence like in a study conducted by To et al.<sup>18</sup>

However, research by Laforest et al<sup>21</sup> reveals that given the higher incidence of depression among women more

interruptions might occur in therapy; thus, deeper research over gender factors influencing adherence would be a better recommendation.

#### 5.6. Single dose vs Multidose inhaler therapy

Concerning the inhaler therapy, this study revealed that, in terms of adherence levels, there is no statistical difference between patients on single inhaler therapy (51.9% of low adherence) and those on dual inhaler therapy (39.1% of low adherence). This has been quite contrary to what Bogart et al. found wherein higher adherence is associate with single use of an inhaler.<sup>22</sup> The lack of significance may thus be indicative of differences in patient population sizes or methodologies used.

### 6. Limitations

There are several limitations to this study. Its sample size was relatively small and limits the generalizability of our findings. Moreover, given that it is a cross-sectional design, the ability to infer causal correlations between drug adherence and sociodemographic characteristics was significantly limited.

## 7. Conclusion

In conclusion, our study found nearly half of adults with OADs have low medication adherence, which is determined significantly by socio-economic status. Adherence was not substantially correlated with either gender or kind of inhaler medication. Patient education and interventions for improving adherence should focus on low-SES groups.

## 8. Recommendation

1. Patient Education: Tailor the counselling to the needs of the low-SES group
2. Adherence Follow-Up: Every visit follows the patient up for adherence to the schedule of treatment.
3. More Simplified Communication Tools For interactive learning, handouts and visual aids are provided
4. Future Research Longitudinal researches must be conducted on potential performances of adherence programs in influencing clinical outcomes.

## 9. Source of Funding

None.

## 10. Conflict of Interest


None.


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