Original Research

PREVALENCE AND DETERMINANTS OF MEDICATION NON-ADHERENCE IN BRONCHIAL ASTHMA: A CROSS-SECTIONAL STUDY FROM A TERTIARY CARE CENTER

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ABSTRACT

Background: Medication adherence is a key determinant of asthma control; however, non-adherence remains a significant barrier to achieving optimal outcomes in bronchial asthma.

Objective: To determine the prevalence of medication non-adherence, identify associated factors, and compare adherence between different inhaler devices among patients with bronchial asthma.

Methods: A hospital-based cross-sectional study was conducted among 111 adult patients with bronchial asthma attending a tertiary care center. Data were collected using a structured questionnaire assessing demographic characteristics, clinical profile, inhaler device use, and adherence behavior. Adherence was evaluated using a self-reported method. Statistical analysis was performed using SPSS software, and associations were assessed using Chi-square or Fisher's exact test.

Results: The prevalence of medication non-adherence was 18.9%. Non-adherence was relatively higher among patients aged 21–40 years, females, and those residing in rural areas; however, these associations were not statistically significant. A marginally higher proportion of non-adherence was observed among dry powder inhaler users compared to metered-dose inhaler users. The most frequently reported reasons for non-adherence were perceived improvement in symptoms and lack of perceived need for continued therapy. Other contributing factors included fear of dependence, concerns regarding side effects, and difficulties related to inhaler use.

Conclusion: Medication non-adherence affects a considerable proportion of patients with bronchial asthma and is predominantly driven by behavioral factors. Strengthening patient education and reinforcing adherence during follow-up are essential to improve disease control and outcomes.

Keywords: Bronchial Asthma, Medication Adherence, Non-Adherence, Inhaler Devices, Dry Powder Inhaler, Metered-Dose Inhaler, Patient Behavior.

INTRODUCTION

Bronchial asthma is a heterogeneous chronic inflammatory disorder of the airways characterized by variable respiratory symptoms and airflow limitation. It represents a significant global health burden, affecting an estimated 300–339 million individuals worldwide, with a rising prevalence in low- and middle-income countries (1).

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Despite advances in pharmacotherapy and the availability of evidence-based management strategies, optimal control of asthma remains suboptimal in a substantial proportion of patients.

Adherence to prescribed medication is a cornerstone in the effective management of bronchial asthma. Inhaled corticosteroids and bronchodilators have been shown to significantly reduce symptoms, prevent exacerbations, and improve quality of life when used appropriately (2). However, poor adherence to therapy continues to be a major barrier to achieving these outcomes. It is estimated that nearly half of patients with chronic asthma do not adhere adequately to their prescribed treatment regimens, contributing to increased morbidity, healthcare utilization, and mortality (3).

Medication adherence in asthma is a complex and multifactorial phenomenon. It is influenced by a combination of patient-related, therapy-related, and healthcare system factors. Behavioral determinants such as patients' perceptions of disease severity, beliefs regarding medication necessity, fear of side effects, and concerns about long-term dependency have been identified as key contributors to non-adherence (4). Additionally, factors such as inadequate inhaler technique, low health literacy, socioeconomic constraints, and poor patient–physician communication further compound the problem (5).

Inhaler-based therapy, which forms the mainstay of asthma management, introduces unique challenges related to device handling and technique. Errors in inhaler use are common and are associated with poor drug delivery and suboptimal disease control (6). Furthermore, variations in adherence patterns between different inhaler devices, such as dry powder inhalers (DPI) and metered-dose inhalers (MDI), have been explored, though findings remain inconsistent across studies.

While several studies have examined adherence patterns in asthma, most evidence originates from high-income settings, and their findings may not be directly generalizable to the Indian population due to differences in healthcare access, cultural beliefs, and patient behavior (7). There remains a relative paucity of region-specific data addressing the prevalence and determinants of medication non-adherence in bronchial asthma within the Indian context.

Therefore, the present study was undertaken to estimate the proportion of non-adherence to prescribed medications among patients with bronchial asthma attending a tertiary care center and to identify the factors associated with non-adherence. Additionally, the study aimed to compare adherence patterns between different inhaler devices.

METHODS

Study Design and Setting

This was a hospital-based cross-sectional study conducted in the Department of Respiratory Medicine at a tertiary care teaching hospital in Mangaluru, India. The study was carried out over a period of 17 months, from April 2021 to September 2022. Cross-sectional designs are commonly employed to assess prevalence and associated factors of adherence behaviors in chronic diseases such as asthma (8).

Study Population

Adult patients aged ≥18 years with a confirmed diagnosis of bronchial asthma, who were on treatment as per Global Initiative for Asthma (GINA) guidelines, were eligible for inclusion. Only those patients who had been on prescribed inhaler therapy for at least one month were considered. Patients who did not provide informed consent were excluded from the study.

Sample Size

The sample size was calculated using standard statistical methods, considering an expected proportion of non-adherence based on previous literature, with a predefined precision and confidence level. A total sample size of 111 participants was determined to be adequate for the study objectives (9).

Data Collection

Eligible participants attending the outpatient department were consecutively enrolled. Data were collected using a structured and pre-validated questionnaire. The questionnaire included sections on demographic characteristics, clinical profile, type of inhaler device used, and medication adherence behavior.

Adherence to prescribed therapy was assessed using a self-reported method. Participants were initially asked whether they were taking their medications as prescribed in terms of dose and frequency. Those who reported deviation or discontinuation were categorized as non-adherent and were further evaluated for reasons contributing to non-adherence. Self-reported adherence measures, although subjective, are widely used in clinical research due to their feasibility and ability to capture patient perceptions (10).

Variables Assessed

The primary outcome variable was medication adherence, categorized as adherent or non-adherent. Independent variables included age, gender, place of residence, educational status, occupation, number of exacerbations in the past year, and type of inhaler device (DPI or MDI). Additional variables included patient-reported reasons for non-adherence.

Statistical Analysis

Data were entered into a spreadsheet and analyzed using Statistical Package for the Social Sciences (SPSS) software, version 26. Descriptive statistics were expressed as mean ± standard deviation for continuous variables and as frequencies and percentages for categorical variables.

Associations between categorical variables and medication adherence were evaluated using the Chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant (11).

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Institutional ethical clearance was obtained prior to the commencement of the study. Written informed consent was obtained from all participants before enrollment, and confidentiality of patient information was maintained throughout the study (12).

RESULTS

3.1 Baseline Characteristics of the Study Population

A total of 111 patients with bronchial asthma were included in the study. The mean age of the participants was 47.31 ± 16.54 years. The largest proportion of patients belonged to the 41–60 years age group, followed by those aged 21–40 years, while younger individuals constituted a smaller proportion of the cohort.

The gender distribution was nearly equal, with a slight predominance of females. More than half of the participants were from urban areas, with the remainder residing in rural settings. With respect to educational status, the majority had attained primary level education, whereas only a small proportion were either illiterate or had professional-level qualifications. A substantial proportion of the study population was unemployed, followed by individuals engaged in clerical, agricultural, or small business occupations.

The baseline demographic characteristics are summarized in **Table 1**, and the age distribution is depicted in **Figure 1**.

3.2 Clinical Characteristics

In terms of clinical profile, the majority of patients reported no exacerbations in the preceding one year, while approximately one-third experienced at least one exacerbation during this period.

Dry powder inhalers were more commonly used than metered-dose inhalers among the study participants.

The clinical characteristics of the study population are presented in **Table 2**.

3.3 Prevalence of Medication Non-Adherence

The overall prevalence of medication non-adherence among the study population was 18.9%, while the remaining 81.1% of patients reported adherence to the prescribed therapy.

The distribution of adherence status is summarized in **Table 3**, and its proportion is illustrated in **Figure 2**.

3.4 Factors Associated with Non-Adherence

When adherence was analyzed across different age groups, the highest proportion of non-adherence was observed among individuals aged 21–40 years, whereas younger patients and older adults demonstrated relatively better adherence patterns.

Female participants showed a slightly higher proportion of non-adherence compared to males. Similarly, patients residing in rural areas exhibited a greater tendency toward non-adherence than their urban counterparts. Variations in adherence were also observed across different levels of education and occupational categories; however, no consistent pattern was evident.

Patients who experienced one or more exacerbations in the previous year demonstrated a relatively higher proportion of non-adherence compared to those without exacerbations.

Despite these observed trends, none of the associations between medication adherence and the evaluated demographic or clinical variables were statistically significant.

These associations are detailed in **Table 4**, and adherence patterns across age groups are illustrated in **Figure 3**.

3.5 Device-wise Comparison of Adherence

When adherence was compared between different inhaler devices, a slightly higher proportion of non-adherence was observed among users of dry powder inhalers compared to those using metered-dose inhalers. However, this difference did not reach statistical significance.

The device-wise comparison is presented in **Table 4** and further illustrated in **Figure 4**.

3.6 Reasons for Non-Adherence

Among the patients identified as non-adherent, the most frequently reported reasons were a perceived improvement in symptoms leading to discontinuation of therapy and the belief that continued medication was not necessary.

Other commonly cited factors included fear of developing dependence on medications and concerns regarding side effects. A smaller proportion of patients reported difficulties related to inhaler technique and forgetfulness in taking medications. Some participants also expressed concerns regarding the harmful effects of medications.

Factors such as high cost, prolonged duration of therapy, and higher dosage were infrequently reported, and none of the patients indicated issues related to the availability of medications.

The distribution of reasons for non-adherence is summarized in **Table 5** and illustrated in **Figure 5**.

DISCUSSION

The present study evaluated the prevalence and determinants of medication non-adherence among patients with bronchial asthma attending a tertiary care center. The overall prevalence of non-adherence in this cohort was 18.9%, indicating that nearly one in five patients did not adhere to their prescribed treatment regimen. This finding underscores that, despite advances in asthma management, adherence remains a clinically relevant challenge.

The observed rate of non-adherence in this study is comparable to several reports from similar healthcare settings, though wide variability exists across the literature. Previous studies have documented non-adherence rates ranging from as low as 10% to as high as 70%, reflecting differences in study design, population characteristics, and methods of adherence assessment (13). The relatively lower prevalence observed in the present

study may be attributed to increased awareness, improved patient–physician communication, and wider availability of inhaler therapies in recent years.

An important observation in this study was the lack of statistically significant association between medication adherence and demographic variables such as age, gender, residence, education, and occupation. Although higher non-adherence was noted among individuals in the working-age group, females, and those residing in rural areas, these trends did not achieve statistical significance. Similar findings have been reported in prior studies, suggesting that demographic characteristics alone may not reliably predict adherence behavior (14). This highlights the complexity of adherence as a multifactorial phenomenon that cannot be explained solely by sociodemographic factors.

The relationship between non-adherence and clinical outcomes, particularly exacerbations, has been explored in several studies with inconsistent results. In the present study, patients with a history of exacerbations demonstrated a relatively higher proportion of non-adherence, although this association was not statistically significant. Some studies have reported a positive association between poor adherence and increased exacerbations, while others have found no such relationship (15). These inconsistencies may reflect differences in study populations, definitions of adherence, and duration of follow-up.

With regard to inhaler devices, the present study found a marginally higher proportion of non-adherence among dry powder inhaler users compared to metered-dose inhaler users; however, this difference was not statistically significant. While certain studies have suggested that device type may influence adherence due to differences in ease of use and patient preference, others have reported no meaningful differences (16). These findings suggest that factors beyond the type of device—such as patient education and technique—may play a more critical role in determining adherence.

One of the most significant findings of this study was the predominance of behavioral and perception-related factors as reasons for non-adherence. The most commonly reported reasons were a perceived improvement in symptoms and the belief that continued medication was unnecessary. This "symptom-driven discontinuation" reflects a fundamental misunderstanding of asthma as a chronic condition requiring ongoing management. Similar observations have been consistently reported in the literature, where patients tend to discontinue therapy once symptomatic relief is achieved (17).

Concerns regarding medication dependence and side effects were also frequently reported. These findings highlight the persistence of misconceptions surrounding inhaler therapy, even among patients receiving regular medical care. Previous studies have emphasized that patient beliefs and attitudes toward medication significantly influence adherence behavior, often more than clinical or economic factors (18). In contrast, cost and availability of medications were infrequently cited as barriers in the present study, suggesting that access to therapy may be less of a limiting factor in this setting.

The findings of this study have important clinical implications. The lack of strong association between adherence and demographic variables, coupled with the prominence of behavioral factors, suggests that interventions aimed at improving adherence should focus on patient education, counselling, and reinforcement of the chronic nature of asthma. Regular assessment of inhaler technique and adherence during follow-up visits is essential, as recommended in current guidelines (19).

Strengths and Limitations

The present study provides real-world insights into medication adherence among asthma patients in a tertiary care setting. The inclusion of both demographic and behavioral variables allowed for a comprehensive assessment of factors influencing adherence. Additionally, the evaluation of device-specific adherence adds to the existing literature.

However, certain limitations must be acknowledged. The use of self-reported measures of adherence may be subject to recall and social desirability bias. The study was conducted at a single center with a relatively small sample size, which may limit the generalizability of the findings. Furthermore, objective measures of adherence, such as electronic monitoring or pharmacy refill data, were not utilized.

CONCLUSION

Medication non-adherence continues to represent a significant barrier to optimal disease control in bronchial asthma. In the present study, nearly one-fifth of patients were found to be non-adherent to their prescribed therapy, underscoring that this issue persists even in a tertiary care setting with access to standard treatment.

The findings indicate that non-adherence is driven predominantly by patient-related behavioral and perceptual factors rather than demographic or access-related determinants. Misconceptions regarding the necessity of continued treatment, particularly following symptomatic improvement, along with concerns about medication dependence and adverse effects, were the most frequently identified contributors. In contrast, economic and availability-related barriers played a comparatively minor role in this cohort.

These observations highlight the critical importance of patient-centered interventions in asthma

management. Effective communication, repeated counselling, and reinforcement of the chronic nature of the disease are essential to improve adherence. In addition, routine assessment of inhaler technique and adherence during follow-up visits should be integrated into standard clinical practice.

Future research incorporating objective measures of adherence and larger, multi-center populations may provide further insights into adherence behavior and help guide targeted interventions. Strengthening adherence through structured educational strategies has the potential to significantly improve clinical outcomes and reduce the burden of asthma.

Table 1. Baseline Characteristics of the Study Population (n = 111)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	1–20	5	4.5
	21–40	35	31.5
	41–60	41	36.9
	>60	30	27.0
Gender	Male	55	49.5
	Female	56	50.5
Residence	Urban	58	52.3
	Rural	53	47.7
Education	Illiterate	2	1.8
	Primary	39	35.1
	Middle school	7	6.3
	High school	20	18.0
	Intermediate	19	17.1
	Graduate	22	19.8
	Professional	2	1.8
Occupation	Unemployed	58	52.3
	Unskilled worker	2	1.8
	Skilled worker	12	10.8
	Clerical/Farmer	26	23.4
	Semi-professional	6	5.4
	Professional	7	6.3

Table 2. Clinical Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Exacerbations (past 1 year)	0	77	69.4
	≥1	34	30.6
Inhaler Device Used	MDI	42	37.8
	DPI	69	62.2

Table 3. Prevalence of Medication Adherence

Adherence Status	Frequency (n)	Percentage (%)
Adherent	90	81.1
Non-adherent	21	18.9

Table 4. Factors Associated with Medication Adherence

Variable	Category	Adherent n (%)	Non-adherent n (%)	p-value
Age (years)	1–20	5 (100)	0 (0)	
	21–40	25 (71.4)	10 (28.6)	0.355
	41–60	34 (82.9)	7 (17.1)	
	>60	26 (86.7)	4 (13.3)	
Gender	Male	47 (85.5)	8 (14.5)	
	Female	43 (76.8)	13 (23.2)	0.244
Residence	Urban	49 (84.5)	9 (15.5)	
	Rural	41 (77.4)	12 (22.6)	0.338
Exacerbations	0	65 (72.2)	12 (57.1)	
	≥1	25 (27.8)	9 (42.9)	0.177
Device Type	MDI	35 (83.3)	7 (16.7)	

	DPI	55 (79.7)	14 (20.3)	0.636

Table 5. Reported Reasons for Medication Non-Adherence (n = 21)

Reason	Frequency (n)	Percentage (%)
Felt better	7	33.3
Did not feel need for medication	7	33.3
Fear of dependence	4	19.0
Side effects	4	19.0
Difficulty in inhaler technique	3	14.3
Forgetfulness	3	14.3
Perception of harm	3	14.3
High dosage	2	9.5
Long duration of therapy	2	9.5
High cost	1	4.8
Perceived lack of usefulness	1	4.8

Figure 1. Age distribution of study participants

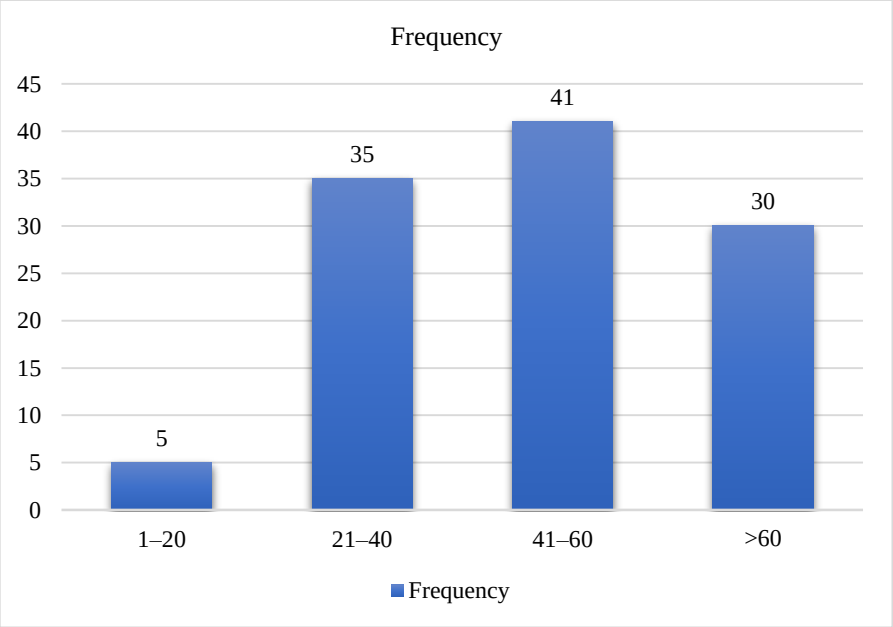


Figure 2. Proportion of medication adherence among study participants

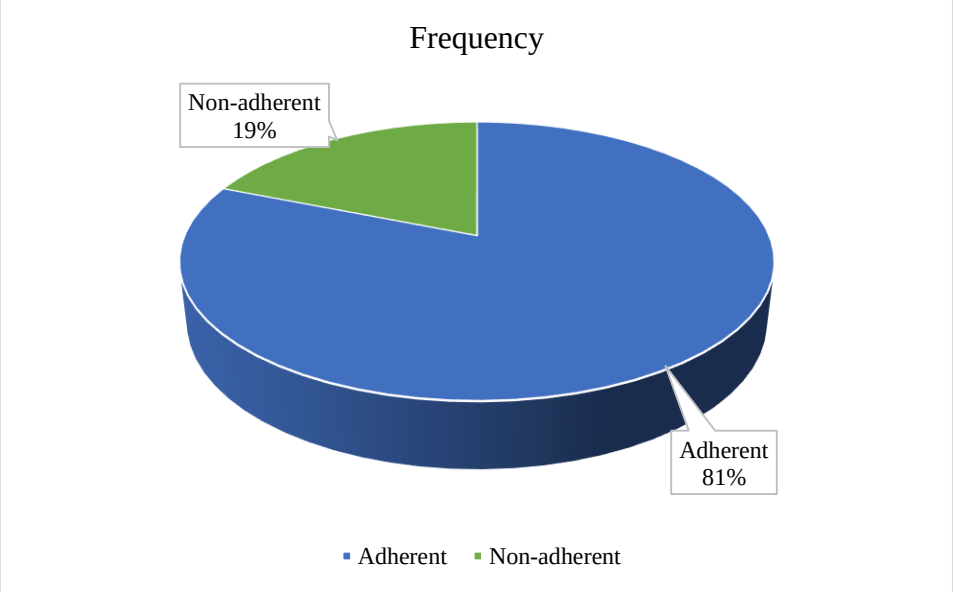


Figure 3. Distribution of adherence status across age groups

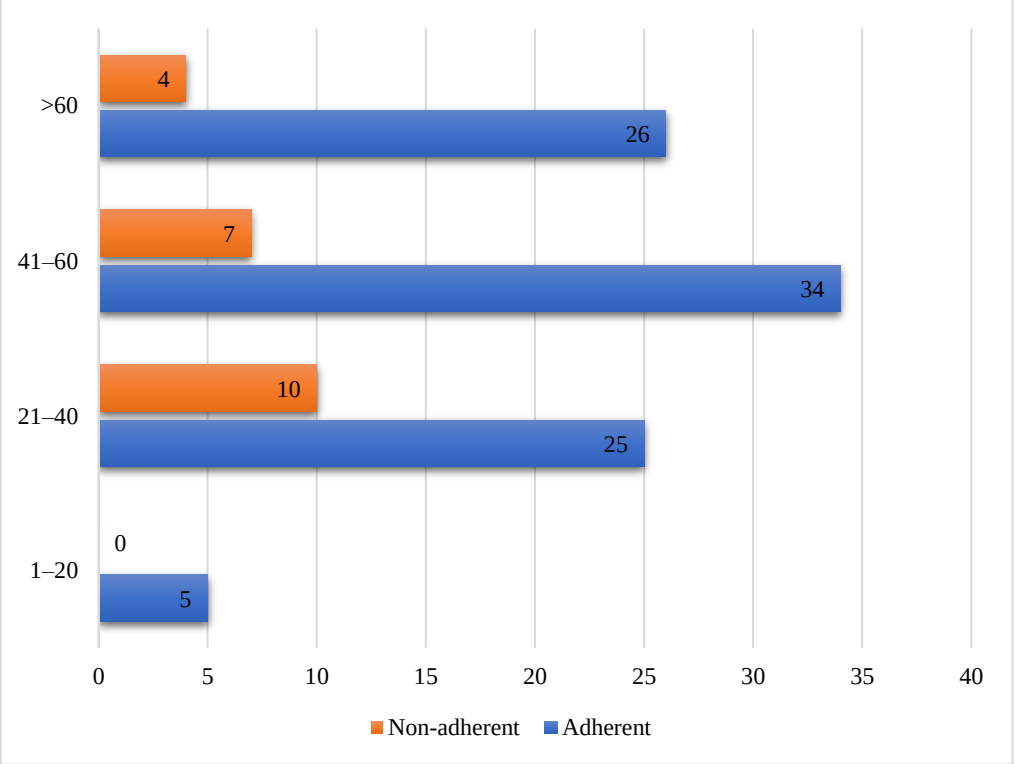


Figure 4. Comparison of medication adherence between inhaler devices

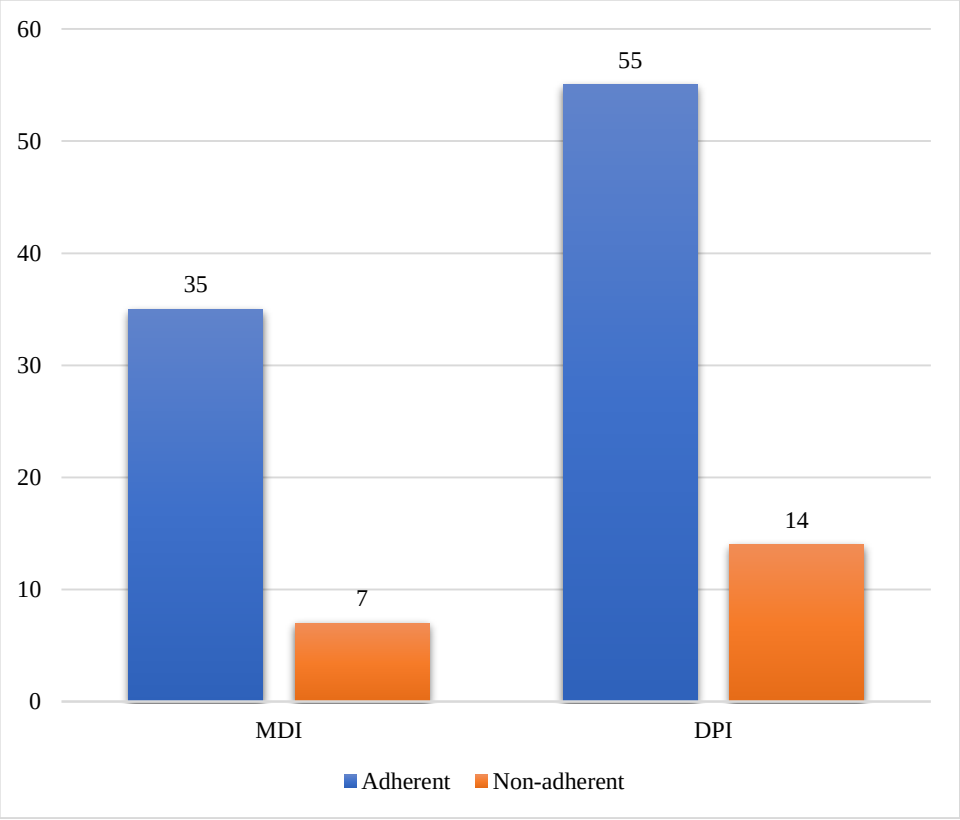
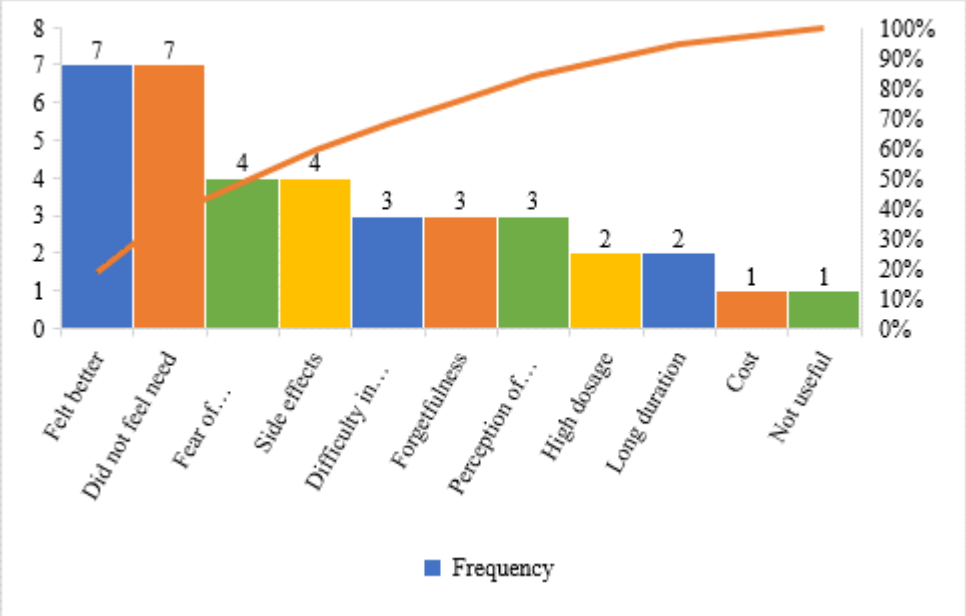


Figure 5. Reported reasons for medication non-adherence



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