RESEARCH PAPER

"A Prospective Observational Study To Assess The Pharmacotherapeutic Adherence In Patients Attending The Outpatient Department Of Respiratory Medicine In A Tertiary Care Hospital"

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Abstract

Objective: Nonadherence to anti-TB treatment may result in the emergence of multidrug-resistant TB, prolonged infectiousness, and poor tuberculosis treatment outcomes. Underuse, overuse, and improper use continue to be the most common causes of poor adherence to Bronchial Asthma therapy. The objective of the study was to determine respiratory disease medication adherence in India.

Methods: Hospital-based cross-sectional study design was conducted from Feb 2025 to October 2025. The data was collected by interviewing respiratory patients receiving Tuberculosis and Bronchial Asthma medications using Morisky's four-item scale questionnaire. The data were analyzed with a chi-square test.

Results: From the total 203 patients of respiratory diseases, of which 180 tuberculosis patients, when asked about adherence to their medications: 128 (71.11%) of them did not forget to take the drugs, 130 (72.22%) of patients reported that they had been being careful in taking their medications, 140 (77.77%), 130 (72.22%) patients did not stop medications when they felt better and when they felt worse while taking medications respectively while in 23 patients of bronchial asthma, when asked about adherence to their medications: 14 (60.86%) of them did not forget to take the drugs, 9 (39.13%) of patients reported that they had been being careful in taking their medications, 8 (34.78%), 11(47.82%) patients did not stop medications when they felt better and when they felt worse while taking medications respectively.

Conclusion: This study revealed that 77.83% of patients were adherent while 22.16% of patients were non-adherent to the medication, of which total adherence in Tuberculosis patients was 85.52% while in Bronchial asthma patients, it was 34.78%.

Keywords: Respiratory diseases, Medication adherence, Compliance, Morisky's scale

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Introduction

According to WHO (2003), adherence to treatment is "the extent to which a patient's behavior taking medication, following a diet, or making healthy lifestyle changes, corresponds with agreed-upon recommendations from a health care provider [1]".

Though the terms adherence and compliance are synonymously used, there is a fine difference between these two terms.

Compliance is the extent to which a patient's behavior matches the prescriber's advice [2]. Compliance implies the degree to which the patient conforms to medical advice about lifestyle and dietary changes as well as to keeping appointments for follow-up and taking treatment as prescribed. In a more direct form, we can say that compliance implies patient obedience to the physician's authority. On the other hand, adherence signifies that the patient and physician collaborate to improve the patient's health by integrating the physician's medical opinion and

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the patient's lifestyle, values, and preferences for care. Adherence is an active choice of patients to follow the prescribed treatment while taking responsibility for their well-being.

In terms of TB control, treatment adherence may be defined as the extent to which the patient's history of therapeutic drug-taking coincides with the prescribed treatment.Assessing and understanding patient adherence in the management of asthma and COPD requires an appreciation of the diversity and complexity of adherence behavior.

In general, medical adherence is better for drugs that provide symptom relief as opposed to ones used to treat a generally asymptomatic condition. For example, chronic conditions [such as COPD, Tuberculosis, and Bronchial Asthma] are common disease characteristics with few symptoms and poor adherence, particularly when the treatment is long term, involves multiple medications taken concurrently, several times daily.

This problem can be overcome by simplifying the therapeutic regimens (for example, the use of extended-release formulation and/or fixed-dose combination finish pharmaceutical products). Furthermore, medication side effects remain a significant issue.

Respiratory diseases are the most common diseases for which patients visit doctors in India. A better understanding of respiratory disease patterns and respiratory symptoms will help determine appropriate health care management strategies and set up necessary health care services of the total respiratory diseases in India, the prevalence of the diseases are COPD (29.6%), Tuberculosis (TB) (23%), Asthma (22.5%), and Allergic Rhinitis (8.4%) [3].

In 2020, an estimated 10 million people developed active TB, resulting in 1.5 million deaths and making it the second leading cause of death from an infectious disease after COVID-19 [4]. India accounts for a quarter of the global TB burden, with an estimated 10 million cases in the year 2020.

The majority of the TB burden is among the working-age group. 89% of TB cases come from the age group of 15-69 y. Uttar Pradesh, with 17% of the population of the country, is the largest contributor to the TB cases in with 20% of the total notifications [5].

Globally, asthma is ranked 16th among the leading causes of years lived with disability and 28th among the leading causes of burden of disease. The highest prevalence (≥20%) was generally observed in English-speaking countries of Australia, Europe, North America, and parts of Latin America. The lowest prevalence <5% is observed in Indian subcontinents [6].

Several factors including socioeconomic status, poor knowledge regarding disease and medications, forgetfulness, and lack of regular follow-up contribute to non-adherence. Despite the increasing burden of respiratory diseases, limited data are available regarding pharmacotherapeutic adherence among Indian patients. Therefore, the present study was conducted to assess medication adherence among tuberculosis and bronchial asthma patients attending the outpatient department of respiratory medicine in a tertiary care teaching hospital.

Materials And Methods

Study setting

The study was conducted by the department of pharmacology in collaboration with the Department of Respiratory medicine at a tertiary care teaching hospital over 9 months commencing from February 2025 to October 2025.

Study design

A cross-sectional, observational study.

Source of data

The patients who attended the outpatient clinic of Dr. Murarilal Chest Hospital, GSVM Medical College, Kanpur (U. P.) diagnosed with COPD, Tuberculosis, Bronchial Asthma, and other Respiratory diseases were included in this study.

Selection of study subject

Patients were included after evaluating for inclusion and exclusion criteria. The written informed consent was taken from each patient before enrollment in the study.

Inclusion criteria

All patients of either Sex, Age of >18 y and have been diagnosed with COPD, Tuberculosis Asthma, and other respiratory diseases. Patients who are on prescription medications for respiratory diseases and taking medication for more than 1 mo. Patients are willing to participate.

Exclusion criteria

Patients of age <18 y were excluded. Patients having other medical or Psychiatric comorbidities were excluded. Pregnant and lactating females.

Methods

This study was a community-based cross-sectional, Observational study. All patients with respiratory diseases fulfilling inclusion and exclusion criteria attending the Respiratory medicine OPD were included in the study. 252 patients were screened and among them, 230 patients were eligible for our study. Out of 230 patients, 27 patients did not give consent. Finally, 203 patients were enrolled in our study.

Respiratory diseases also included COPD and Allergic Rhinitis but the management of COPD was mainly IPD and allergic rhinitis has short-term management, which is also treated in other opds hence we have only included patients with Tuberculosis and Bronchial Asthma in our study.

The selected patients were interviewed regarding their socio-demographic characteristics, income, frequency of drug intake, and reasons for no adherence to medication by using a preformed questionnaire. The study subjects were grouped into the socioeconomic classes modified kuppuswamy scale for urban population and modified B. G. Prasad scale for the rural population.

It also included questions to test their knowledge and beliefs of COPD, Tuberculosis Asthma, and other respiratory ailments and the use of oral anti-tubercular drugs and antiasthmatic drugs with other respiratory ailments.

The questions were translated to the patients in the Hindi Language.

Before assessment of adherence in patients, we excluded the patients suffering from depression, anxiety, and stress as per the DASS scale. Adherence was assessed through the specific four questionnaires of Morisky's adherence scale that has high reliability and validity, and the patient is considered to be adherent if he/she answered no to all questions.

Statistical analysis

The data was compiled and converted in the form of tables and graphs. Statistical analysis was done using the Chi-square test and a p-value of 0.05 or less was considered statistically significant.

Results

The present study was conducted at the Pharmacology Department in collaboration with the Department of Respiratory medicine in G.S. V. M Medical College.

Table 1: Socio-demographic variables and knowledge of patients in Tuberculosis patients, Tuberculosis

		N=180	Percentage
Gender	Male	152	84.44%
	Female	28	15.55%
Age group	18-40y	124	68.88%
	41-60y	36	20%
	>60y	20	11.11%
Residence	Urban	150	83.33%
	Rural	30	16.66%
	Total	180	
Socioeconomic status kuppuswamy scale (Urban)	I	0	0%
	II	115	63.88%
	III	30	16.66%
	IV	20	11.11%
	V	0	0%
Socioeconomic status B. G. Prasad scale (Urban)	I	9	5%
	II	6	3.33%
Knowledge about disease	Knowledge	150	83.33%
	Not Knowledge	30	16.66%
	Total		
Knowledge about medication	Knowledge	144	80%
	Not Knowledge	36	20%
	Total		

N= Number of patients

This study has been conducted on 203 patients diagnosed with Respiratory diseases like Tuberculosis and Bronchial Asthma. Out of 203 patients, 180 were Tuberculosis patients and 23 were Bronchial Asthma Patients.

From the above table, it can be concluded that a total of 180 Tuberculosis patients were involved in this study. The response rate was 100%. Among the total 180 patients, 152 (84.44%) were males and 28 (15.55%) were females. The majority of patients were of age group 18-40 y i.e. 68.88%. Patients of age group 41-60 y were 20% and patients of age group >60 y were 11.11%. A large proportion of patients 150 (83.33%) were urban with the residence. As shown in the table, among the urban population as per the kuppuswamy classification, the majority of the patients i.e. 115 (63.88%) belong to socioeconomic class II. 16.66% belong to socio-economic class III. 11.11% belongs to class IV. In the rural population as per B. G. Prasad classification, mostly patients i.e. 5% belong to socioeconomic class I and 3.33% belong to class II.

Most of the respondents were knowledgeable on Tuberculosis (83.33%) and their medications (16.66%).

Table 2: Morisky's instrument: question-wise percentage of medication adherence

S. No.	Four questions patient's questionnaire (Morisky's Instrument)	No. of patients who said "no"	Percentage (%)

1	Do you sometimes forget to take your Medication?	128	71.11%
2	Were u careless at times about taking your medications?	130	72.22%
3	When you felt better did you sometimes stop taking your medication?	140	77.77%
4	Sometimes if you felt worse when you took your medicine did you stop taking it	130	72.22%
	The number of patients who said 'No' to all four questions was considered adherent to the prescribed anti-tubercular medications.	150	83.33%

From the patients of tuberculosis, when asked about adherence to their medication as per Morisky's four-item method, 128 (71.11%) of them did not forget to take the drugs, 130(72.22%) of patients reported that they had been being careful in taking their medication, 140(77.77%) patients did not stop medications when they felt better and the other 130 (72.22%) patients reported that they did not stop medications when they felt worse while taking medications (table 2). Concerning the overall adherence status, this study shows that 150 (83.33%) respondents were adherent to their medications and 30 (16.66%) of them were non-adherent. The adherence status of each patient was determined based on his/her response to four adherence questions. Patients who replied "no" to all four questions were categorized as adherent.

Table 3: Patients distribution according to adherence and non-adherence level in different variables among tuberculosis patients

Tuberculosis								
		non-adherence	**% of non-adherence**	**Adherence**	**% of adherence**	**Total**	**Chi square**	**p-value**
Gender	Male	22	14.47%	130	85.52%	152	3.383	0.6586
	Female	8	28.57%	20	71.43%	28		
	Total	30	16.66%	150	83.33%	180		
Age group	18-40 y	19	15.32%	105	84.67%	124	0.5213	0.706
	41-60 y	7	19.44%	29	80.56%	36		
	>60 y	4	20%	16	80%	20		
	Total	30	16.66%		83.33%			
Residence	urban	12	8%	138	92%	150	48.67	0.0001
	Rural	18	60%	12	40%	30		
		30	16.66%	150	83.33%	180		
Socioeconomic status Kuppuswamy scale (Urban)	I	0	0%	0	0%	0	40.52	0.000001
	II	5	16.66%	110	73.33%	115		
	III	10	33.33%	20	13.33%	30		
	IV	10	33.33%	10	6.66%	20		
	V	0	0%	0	0%	0		
	Total	25	83.33%	140	93.33%	165		
Socioeconomic status B G prasad scale (Rural)	I	3	10%	6	4%	9	0	1
	II	2	6.66%	4	2.66%	6		
	Total	5	16.66%	10	6.66%	15		
Knowledge about disease	knowledgeable	18	60%	132	88%	150	14.11	0.0001722
	Not knowledgeable	12	40%	18	12%	30		
	Total	30	16.66%	150	83.33%	180		
Knowledge about	knowledgeable	16	53.33%	128	85.33%	144	16	0.00006334

medication	Not knowledgeable	14	46.66%	22	14.66%	36		
		30	16.66%	150	83.33%	180		

Prevalence of non-adherence and adherence according to Morisky's scale was 22(14.47%) and 130(85.52%) respectively in males; 28.57% and 71.43% in females but the difference was not statistically significant (p>0.05). 18-40 y of age group had non-adherence i.e. 15.32% and adherence 84.67%, 41-60 y of age group had non-adherence i.e. 19.44% and adherence i.e. 80.56%, >60 y of age group had non-adherence i.e. 20% and adherence 80% but the difference was not statistically significant (P>0.05). As per the urban residence population had non-adherence of 8% and adherence i.e. 92%, while the rural population had non-adherence 60% and adherence 40% here, the difference was statistically significant (p<0.05). Among the urban population, as shown in the table as per kuppuswamy classification, the majority of patients belonging to socio-economic class II had a non-adherence level 16.66%, class III had non-adherence level 33.33% and class IV had a non-adherence level 33.33% while adherence level in class II, III and IV was 73.33%, 13.33% and 6.66% which was statistically significant (p<0.05). In the rural population as per B. G. Prasad classification class, I had an adherence level of 10% and class II had a non-adherence level of 6.66%, while adherence level in classes I and II was 4% and 2.66% which was not statistically significant (p>0.05). Most of the respondents were knowledgeable in their medications. These 53.33% of patients were non-adherent, and 85.33% of patients were adherent to medications. Those patients who were not knowledgeable they show non-adherence 46.66% and adherence 14.66%. Here the difference was statistically significant (p<0.05).

Table 4: Socio-demographic variables and knowledge of patients in Bronchial Asthma patients

		Percentage
Gender	Male	15(65.21%)
	Female	8(34.78%)
Age group	18-40 y	3(13.04%)
	41-60 y	6(26.08%)
	>60 y	14(60.86%)
Residence	Urban	11(47.82%)
	Rural	12(52.18%)
	Total	
Socioeconomic status Kuppuswamy scale (Urban)	I	0
	II	6(26.08%)
	III	6(26.08%)
	IV	6(26.08%)
	V	0
Socioeconomic status BG Prasad Scale (Rural)	I	3(13.04%)
	II	2(8.69%)
Knowledge about disease	knowledgeable	65.21%
	Not knowledgeable	34.78%
	Total	
Knowledge about medication	knowledgeable	65.21%
	Not knowledgeable	34.78%
	Total	

From the above table, it can be concluded that a total of 23 Asthmatic patients were involved in this study. The response rate was 100%. Among the total of 23 respondents, 15 (65.21%) were males and 8(34.78%) were females. The majority of patients were of age group>60 y i.e. 60.86%, patients of age group 41-60 y i.e. 26.08%, and patients of age group 18-40 y were 13.04%. A large proportion of patients were rural 12(52.18%) residents. As shown in the table, among the urban population as per the kuppuswamy scale an equal number of patients belongs to socio-economic classes II, III, and IV, respectively. In the rural population as per B. G. Prasad classification, 13.04% belong to group 1 and 8.69% belong to group II. Most of the respondents were knowledgeable on Bronchial Asthma 65.21% and their medications 65.21%.

Table 5: Morisky's instrument: Question wise percentage of medication adherence

S. No.	4 question patient's questionnaire (Morisky's Instrument)	No. of patients who said "no"	Percentage (%)
1	Do you sometimes forget to take your Medication?	14	60.86%
2	Were u careless at times about taking your medications?	9	39.13%
3	When you felt better did you sometimes stop taking your medication?	8	34.78%
4	Sometimes if you felt worse when you took your medicine, did you stop taking it	11	47.82%
	The number of patients who said 'No' to all four questions was considered adherent to the prescribed anti-asthmatic medications	8	34.78%

From the patients with Bronchial asthma, when asked about adherence to their medication as per Morisky's four-item method, 14 (60.86%) of them did not forget to take the medications, 9 (39.13%) of patients reported that they has been careful in taking their medications, 8 (34.78%) patients did not stop medications when they felt better and the other 11(47.82%) patients reported that they did not stop medications when they felt worse while taking medications (table 5). Concerning the overall adherence status, this study shows that 34.78% of the respondents were adherent to their medications, while 65.21% of them were non-adherent to medications. The adherence status of each patient was determined based on his/her response to four adherence questions. Patients who replied "no" to all four questions were categorized as adherent.

Table 6: Patients distribution according to adherence and non-adherence level in different variables among asthmatic patients

		Bronchial asthma						
		Non-adherence	% of non-adherence	Adherence	% of adherence	Total	Chi-square	P-value
Gender	Male	10	66.66%	5	33.34%	15	0.03993	0.8416
	Female	5	62.50%	3	37.50%	8		
	Total	15	65.27%	8	34.78%	23		
Age group	18-40 y	1	33.33%	2	66.66%	3	1.588	0.4520
	41-60 y	4	66.66%	2	33.33%	6		
	>60 y	10	71.42%	4	28.57%	14		
	Total	15	65.21%	8	34.78%	23		
Residence	Urban	5	45.45%	6	54.55%	11	3.63	0.05675
	Rural	10	83.33%	2	16.67%	12		
	Total	15	65.21%	8	34.78%	23		
Socioeconomic status Kuppuswamy scale (Urban)	I	0	0%	0	0%	0	1.50	0.4724
	II	3	20%	3	37.50%	6		
	III	4	26.66%	2	25%	6		
	IV	5	33.33%	1	12.50%	6		
	V	0	0%	0	0%	0		
	Total	12	80%	6	75%	18		
Socioeconomic status BG Prasad Scale (Rural)	I	2	13.33%	1	12.50%	3	0.1389	0.7094
	II	1	6.66%	1	12.50%	2		
	Total	3	20%	2	25%	5		
Knowledge about disease	knowledgeable	9	60%	6	75%	15	0.5175	0.4719
	Not knowledgeable	6	40%	2	25%	8		

	Total	15	65.21%	8	34.78%	23		
Knowledge about medication	knowledgeable	10	66.66%	5	62.50%	15	0.03993	0.8416
	Not knowledgeable	5	33.33%	3	37.50%	8		
	Total	15	65.21%	8	34.78%	23		

Prevalence of non-adherence and adherence according to Morisky's scale was 10(66.66%) and 5(33.34%) in males; 5(65.27%) and 3 (37.50%) in females, But the difference was not statistically significant (p>0.05).

>60 y age group had non-adherence i.e., 71.42% and adherence i.e., 28.57%, 41-60 y age group had non-adherence 66.66% and adherence 33.33% while 18-40 y had non-adherence 33.33% and adherence 66.66%, But the difference was not statistically significant (p>0.05). As per residence urban population had non-adherence of 45.45% and adherence of 54.55% and the rural population had 83.33% non-adherence and 16.66% adherence, but the difference was not statistically significant (p>0.05).

Among the urban population, as seen in the table as per kuppuswamy classification, the majority of patients belonging to socio-economic class IV had a non-adherence 33.33%, class III had a non-adherence 26.66% and class II had a non-adherence of 20%. Class II had an adherence level i.e. 37.50%, class III had an adherence level of 25% and class IV had an adherence level of 12.50%, but the difference was not statistically significant (p>0.05).

In the rural population as per B. G. Prasad classification class, I had a non-adherence level of 13.33% and class II had a non-adherence level of 6.66%, and adherence level in class I i.e. 12.50%, and in-class II i.e. 12.50% but the difference was not statistically significant (p>0.05). Most of the respondents were knowledgeable about their medication. This 66.66% of patients were non-adherent and 62.50% were adherent. Those patients who were not knowledgeable they show 33.33% non-adherence and 37.50% adherence but the difference was not statistically significant (p>0.05).

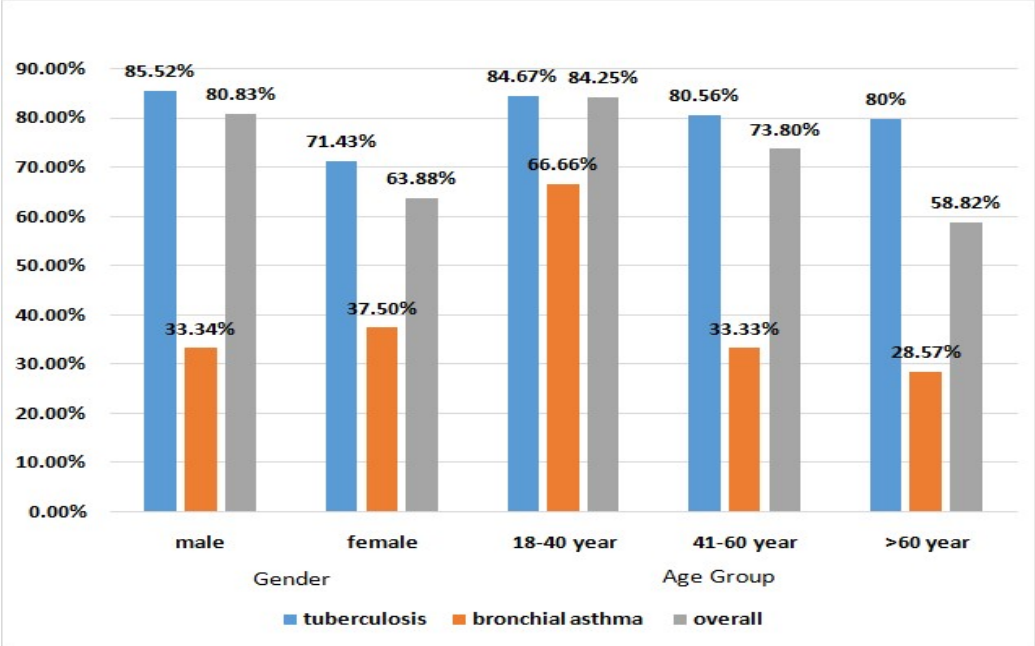

Fig. 1: Percentage of adherence in different variables among tuberculosis, bronchial asthma, and overall

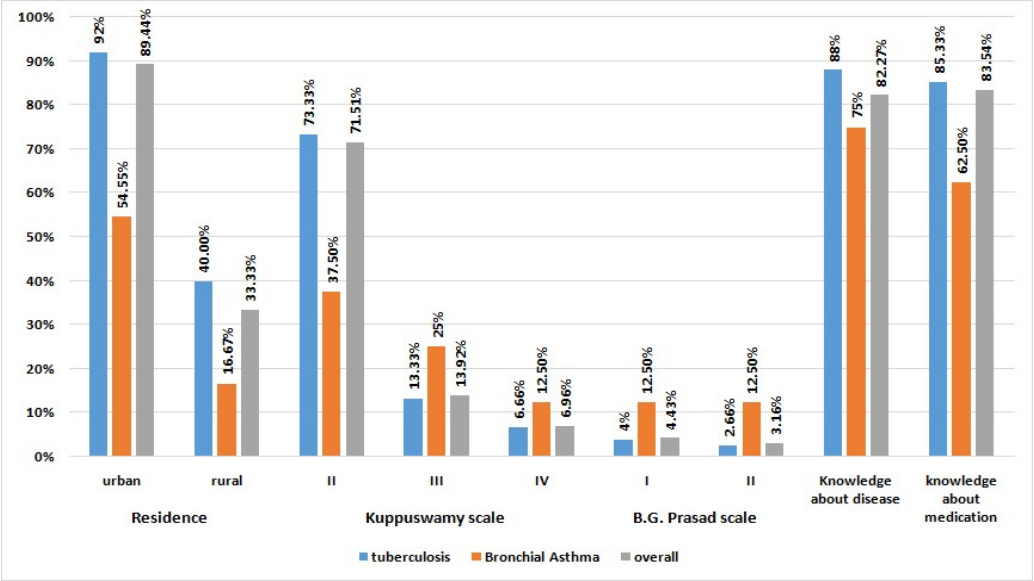

Fig. 2: Percentage of adherence in different variables among tuberculosis, bronchial asthma, and overall

Table 7: Reasons of pharmacotherapeutic non-adherence

S. No.	4 question patient's questionnaire (Morisky's instrument)	No. of patients who said "no"	Percentage (%)	No. of patients who said "yes"	Percentage (%)
1	Do you sometimes forget to take your Medication?	180	88.66%	23	11.33%
2	Were u careless at times about taking your medications?	182	89.65%	21	10.34%
3	When you felt better, did you sometimes stop taking your medication?	190	93.59%	13	6.40%
4	Sometimes if you felt worse when you took your medicine, did you stop taking it	193	95.07%	10	4.92%
	The number of patients who said No to all 4 questions was considered adherent to the prescribed	158	77.83%	45	22.16%

After going through the above table 7 it revealed that the reasons for non-adherence out of 203 enrolled patients were as follows 23 (11.33%) patients said that they stopped/missed the medication because of forgetfulness; 21 (10.34%) patients said that they stopped/missed the medication because of carelessness; 13 (6.40%) patients said that they stopped/missed the medication when he or she felt better; 10(4.92%) patients said that they stopped/missed the medication when he or she felt worse while taking medicines.

The number of patients who said 'Yes' to one or more than one of four questions was considered non-adherent to the prescribed treatment.

Prevalence of medication adherence in patients

Among the total 203 patients, 158(77.83%) were considered adherent according to Morisky's instrument while 45(22.16%) patients were non-adherent.

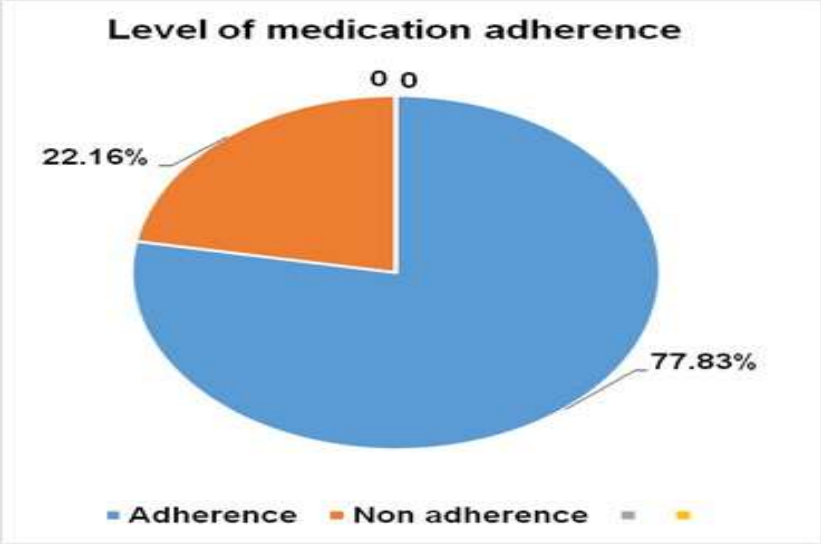

Fig. 3: Respondent's level of medication adherence among tuberculosis, Asthma, and overall disease

Discussion

The prevalence of average adherence to medications in our study was 83.33% in Tuberculosis and 34.78% in Asthma. The prevalence of adherence to medications in males was 80.83% in comparison to females 63.88% was good. This finding is in line with most of the previous studies Manjusa Sajith et al. (Pune) [7], Jemal A et al. (Eastern Ethiopia) [8]. Most females are less educated in comparison to males; they have limited knowledge towards their disease, medications, and complications related to discontinuation of drugs leads to their being careless. And because of less literacy, they are unable to understand dosing, and frequency of drug intake.

The effect of gender on the rate of adherence to medication in other research studies is contradictory. Chythra R Rao et al. (Karnataka) [9], Belayneh Kefale Gelaw et al. (Ethiopia) [10], Tarig Mohammed EI Haydiah et al. (Sudan) [11] reported female patients were found by some researchers to have better adherence. Compliance to treatment was better among females as compared to males but gender was not identified as a significant variable. More women were likely to report that they found it difficult to visit the hospital as they lost wages or were not permitted to leave from the work. Inability to visit health facilities during working days may have contributed to keeping men away from health facilities; the reason for the study population being predominantly women. In our study, adherence in Tuberculosis and Bronchial asthma patients is higher in the age group 18-40 y. This finding is in line with the most previous studies A Kamran et al. in Ardabil city (Iran) [12], Targi Mohammed EI Hadiyah et al. (Sudan) [11] reported higher adherence among people above 60 y of age and in 30-39 y. Aymen Elsous et al. [13] reported old age (>60 y) was a predictor of good adherence. It is also important to note that the social support system among families to take full responsibility for routine medications for the elderly is contributory to good medication adherence. However, Tuberculosis drug therapy is more complex and patients are required to have more complex cognitive skills to be able to understand the prescribed drug therapy and to adhere to treatment for the good result, which could be the reason for adherence in the age group of 18-40 y as shown in our study.

In our study Bronchial Asthma patients with pharmacotherapeutic adherence with the duration of Bronchial asthma<5 y (47.82%), 6-10 y (21.73%), and>10 y (30.43%) were observed which was in line with Jemal A et al. (Eastern Ethiopia) [8], Beayneh Kefale Gelaw et al. (Ethiopia) [10]. This finding was consistent with the study from UAE and India, indicating a negative relationship between the duration of Bronchial Asthma and patient adherence to drug therapy. In our study, Knowledge about the disease and medications in patients show pharmacotherapeutic adherence 82.27% and 83.54%, respectively, which is statistically significant regarding knowledge on disease ($p<0.05$) and statistically non-significant regarding knowledge on medications ($p>0.05$). Knowledge of the disease and its medications was found to be positively associated with the adherence level of patients. Manjusa Sajith et al. (Pune) [7], Mastewal Abebaw et al. (Northwest Ethiopia) [14], Vincent Boima et al. (Ghana and Nigeria)[15], Heloisa Turcatto Gimens et al. (Southeastern Brazil)[16], Khaled Heissamet et al. (Egypt)[17] have reported that knowledge patients were found to be significantly associated with higher adherence rate. The possible justification of why people with better knowledge were adherent could be the right knowledge about the disease and its medications which creates a clear understanding and avoids confusion about the treatment and the disease condition. But people with wrong/poor knowledge may reach with wrong decisions. Fatmah Alsolami et al. (Saudi Arabia) [18] reported no statistically significant association between knowledge of disease and its

treatment and medication adherence. This is contrary to the findings from another study which found that knowledge is a significant predictor of treatment adherence.

In our study of urban patients, 89.33% were more adherent to medications in respect to rural patients 33.33%. Manjua Sajith et al. (Pune) [7] reported that place of residence is an important determinant where 37.14% of patients of urban have shown a higher rate of adherence compared to a rural area. This is because those in rural residencies are more likely to give low attention to their medication being more distant from the health care setting and are less likely to seek health information compared to urban residents. In our study, among 203 patients, upper-middle-class patients as per modified kuppuswamy classification of socioeconomic status, were more pharmacotherapeutic adherent (71.51%) in comparison to other classes (Lower middle class i.e. (13.92%) and upper lower class (6.96%).

In Tuberculosis patients, upper-middle-class patients as per modified kuppuswamy classification of socioeconomic status were more pharmacotherapeutic adherent (73.33%) in comparison to other classes (Lower middle class 13.33%, upper lower class 6.66%. In bronchial asthma patients, upper-middle-class patients as per modified kuppuswamy classification of socioeconomic status, were more pharmacotherapeutic adherent (37.50%) compared to other classes (Lower middle class 25%, upper lower class 12.5%). As the patients in the lower middle class stuck to the medications prescribed by the physician but the patients in the upper-middle-class population are well educated so they alter the continuation of the medication. Overall upper-middle-class patients as per the modified kuppuswamy classification of socioeconomic status, were more pharmacotherapeutic adherent in comparison to other classes. Kuppuswamy scale of socioeconomic status (which consists of the complete score of occupation, education, and total monthly income of the head of the family), because the upper-middle-class population is well educated and their attitude towards taking medication is good.

The identified causes of non-adherence to taking medications as prescribed were forgetfulness, carelessness when felt worse and when felt better while taking medications were found to be respectively in our study, which was in line with the study of Manjusa Sajith et al. (Pune) [7]. Possible causes for non-adherence to taking medications could be forgetfulness, nature of work and busy schedules, traveling away from home, long clinic wait time. A study identified bus work schedules, especially for patients in the working population as one of the reasons. Jemal A et al. (Eastern Ethiopia)[8], Mohammed Arifulla et al. (UAE) [19], Gelaw BK et al. (Ethiopia) [10], Tarig Mohammed EI-Hadiyah et al. (Sudan) [11] reported forgetfulness was one of the commonly mentioned reasons for non-adherence, which could be overcome by using different measures like informing family members to remind, and using the alarm. Intentional omission of doses was the next factor. Patients omit the doses of their medications simply because the medications run out of they go elsewhere from home. The other common factor causing non-adherence in this study was lack of finance. The most common reasons stated for the non-adherence to medications were modifiable factors that could be overcome by adopting suitable measures. In our study, according to Morisky's instrument, 77.83% were adherent, while 22.16% of patients were non-adherent among the total of 203 participants. Among Tuberculosis patients, 83.33% of the patients were adherent while 16.66% of the patients were non-adherent. Among Asthmatic patients, 34.78% were adherent while 65.21% were non-adherent.

Limitations Of Study

The study was conducted at a single tertiary care center and adherence was assessed using a self-reported questionnaire, which may overestimate adherence. Larger multicentric studies are recommended.

Conclusion

Medication adherence remains an important determinant of successful management of respiratory diseases. Tuberculosis patients demonstrated better adherence compared to bronchial asthma patients. Continuous patient education, regular monitoring, and adherence counseling are essential to improve treatment outcomes and reduce disease burden.

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Authors Contributions

All the authors Dr. Mangesh Kumar Tripathi, Dr Sarita Singh and Dr Pragya Jain have equally made a substantial contribution in the conception, acquisition of data, interpretation of data and in drafting the article and agreed to be held accountable for all aspects of the work.

Conflict Of Interests

Declared none

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