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DRUG THERAPY PRACTICES IN RESPIRATORY DISEASES AT A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

Pharmaceutical Science

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ABSTRACT

Background: Respiratory diseases encompass a broad range of illnesses affecting the lungs and airways, hindering the body's ability to properly breathe and exchange gases. Respiratory diseases can significantly impact a person's quality of life and overall health. Drug therapy practices are essential to optimize outcomes, minimize adverse effects, and promote the appropriate use of medications. **Objective:** To assess drug therapy practices in respiratory diseases, identify commonly prescribed drugs, categorize them by treatment regimens, and evaluate prescribing practices using WHO indicators. **Methods:** A prospective observational study was conducted among 162 adult inpatients in the Pulmonary and General Medicine departments of SVRRGGH, Tirupati. for a period of 6 months. Data was collected through patient interview & case record reviews using a structured proforma and analysed by using MS excel and SPSS. **Results:** In the study, 72.22% were males, with most aged 61–70 years. Pneumonia (16.05%) was the most common diagnosis, followed by COPD with AE. Polypharmacy was prevalent, with an average of 10.37±2.32 drugs per prescription Among the study population, ABG analysis was performed to determine the statistically significant correlations between pH, pO2 and pCO2 ($p<0.02$). **Conclusion:** In our study, promoting rational prescribing practices and enhancing patient education are essential to improve therapeutic outcomes.

KEYWORDS

Respiratory diseases, Drug-therapy practices, WHO indicators

INTRODUCTION:

Respiratory system diseases can affect any of the breathing-related structures and organs. The respiratory system plays an essential role in supplying the body with oxygen. In turn, it removes carbon dioxide residues and toxins, and it also regulates temperature and stabilizes blood [1]. According to the Global Burden of Disease (GBD) survey, India has a high prevalence of both acute and chronic respiratory conditions. The burden of respiratory diseases is exacerbated by socioeconomic factors. Loss of productivity and high expenditure on medications are significant contributors to the overall disease burden [2]. Drug Therapy Practice is commonly called as DUR, can potentially be beneficial in the healthcare system's understanding, interpretation, and improvement of pharmaceutical prescription, administration, and use [3]. Evaluation of drug use patterns with WHO drug use indicators is an obligatory step for promoting rational use of drugs. Based on this, the present study aims to educate patients and healthcare professionals on the appropriate utilization of medications and the assessment of drug usage in treating respiratory diseases. Determining whether drug use is suitable for treating a certain patient can be done with the use of the drug utilization review (DUR) technique [4].

Objectives:

1. To assess the drug utilization pattern of respiratory diseases.
2. To identify the most prescribed drugs for respiratory diseases such as asthma, COPD, pneumonia, etc.
3. To categorize the drugs according to their treatment regimen.
4. To assess the appropriate use of drugs.
5. To assess the usage of drugs by using WHO indicators.

Methodology:

Study Design: A Prospective observational study.

Study Site: The study will be conducted in the department of pulmonary medicine and general medicine, SVRRGGH, tirupati.

Study Duration: November 2024 – April 2025 (6 months)

Study Population: 162 patients

Ethical Approval: The study was approved by institutional ethical committee with proposal no: SPSP/2024-2025/PHD16

Study Materials:

- Patient data collection proforma.
- Informed consent form
- WHO list

Study Criteria:

Inclusion Criteria: In-patients of either gender who are above 18 years diagnosed with respiratory diseases with or without co-morbidities admitted in pulmonary medicine and general medicine and Patients who are willing to participate were included in the study.

Exclusion Criteria:

1. Paediatric patients
2. ICU and unconscious patients
3. Pulmonary Tuberculosis patients
4. Pregnant and lactating women.

Method Of Data Collection:

A prospective observational study was carried out after obtaining the permission of institutional review board, SPSP/2024-2025/PHD16 Sri Padmavathi School of Pharmacy, Tiruchanoor, Tirupati, A.P, India. All adult patients (greater than 18 years), admitted in the Pulmonary Medicine and General Medicine inpatient ward of SVRRGGH were included in the study. We informed them about the anonymity and confidentiality of the data voluntary nature of their participation. Patients who were willing to participate were asked to sign the informed consent form. Data was collected via a specially designed proforma. The first part includes questions on socio-demographic characteristics, past medical history, social habits, co-morbidities, duration, history of documented respiratory complication, diagnosis, and prescribed drugs for each patient. The data was obtained by direct patient interviews and from patient case profiles.

162 cases were collected from Pulmonary Medicine and General Medicine wards, according to the study criteria. All the prescriptions were analysed for the appropriate drug use by using WHO prescribing indicators, 2016. The WHO prescribing metrics from 2016 were used to examine prescriptions. Study results were obtained with the help of Microsoft Excel and interpreted them by descriptive statistical analysis using SPSS software.

RESULTS:

A total of 162 adult inpatients were enrolled in the study during study period with informed consent form of their accompanying caregivers. In the study, majority number of patients were under the age group of 61 - 70 years were 37 (22.83%), followed by 51-60 years were 36 (22.22%), and 71- 80 years were 30 (18.58%) respectively. In our study, males 117 (72.22%) share a larger proportion than females 45 (27.78%). Among 162 patients, 43 (31%) patients were alcoholics, followed by 38 (28%) were smokers. Out of 131 patients 35 (26.72%) were identified with PTB followed by 32 (24.43%) were identified with DM and 31(23.66%) were with HTN. Among 162 patients included in the study, the most observed condition was Pneumonia 26 (16.05%), followed by COPD with acute exacerbation 16 (9.88%) and Acute Pulmonary Edema 14(8.637%).

Out of 162 prescriptions, the majority 97 (59.87%) included 11–15 drugs, followed by 60 (37.03%) with 6–10 drugs. Only 4 prescriptions (2.5%) contained more than 15 drugs, while just 1 prescription (0.6%) had 1–5 drugs. Out of a total of 1538 drugs prescribed, the majority were administered via injection 768 (49.93%), followed by oral dosage forms 602 (39.14%), and inhalation forms 168 (10.93%). Out of 400 brand-name drug prescriptions, Deriphylline was the most frequently prescribed (110 times), followed by Piptaz (53), Cefsulbactam (52), and Lasix (43). Out of 810 total generic drug prescriptions, Pantoprazole was the most frequently prescribed drug (152 times), followed closely by B Complex/Vitamin C (108) and Paracetamol (107). Ceftriaxone (47) and Azithromycin (36) were the most used antibiotics. Among the 159 corticosteroid prescriptions, Budesonide was the most frequently used (133; 83.65%), followed by Methylprednisolone (15; 9.42%) and Hydrocortisone (10; 6.3%). Dexamethasone was prescribed least frequently, accounting for only 1 prescription (0.63%). A total of 265 antibiotics were prescribed. The most frequently prescribed were Piperacillin + Tazobactam 53 (20%) and Cefoperazone + Sulbactam 52 (19.62%), followed by Ceftriaxone 47 (17.75%) and Azithromycin 36 (13.6%).

Among the 304 adjunctive therapies prescribed, Pantoprazole was the most frequently used agent, accounting for 50% of prescriptions. B Complex/Vitamin C followed with 35.5%, highlighting the emphasis on vitamin supplementation. Other supportive agents like Iron Folic Acid (3.94%), Iron Sucrose (2.96%), and Calcium + Vitamin D3 (1.97%) were used in smaller proportions.

Out of 411 fixed-dose combinations prescribed, the most used was Duolin + Budesonide 133 (32.36%), followed by Etophylline + Theophylline 110 (26.76%) and Piperacillin + Tazobactam 53 (12.9%).

Among the study population, ABG analysis was performed to determine the statistically significant correlations between pH, pO2 and pCO2. There was a strong positive correlation between pCO2 and pO2 with a correlation coefficient of r = 0.021, p-value <0.002, indicating a statistically significant relationship.

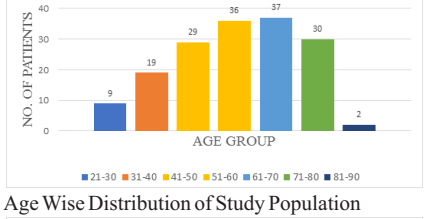

Figure 1: Age Wise Distribution of Study Population

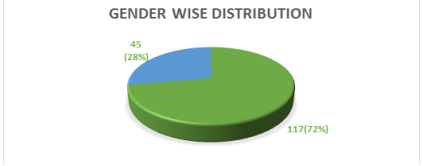

Figure 2: Gender Wise Distribution of Study Population

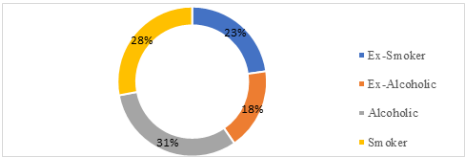

Figure 3: Distribution Of Study Population Based on Social Habits

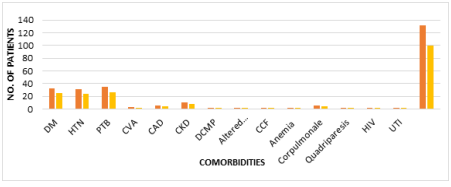

Figure 4: Distribution Of Comorbidities Among the Study Population

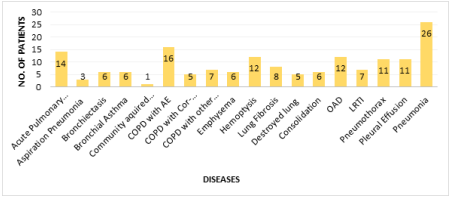

Figure 5: Prevalence Of Respiratory Diseases

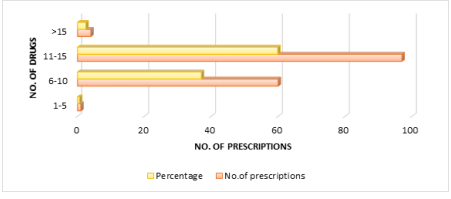

Figure 6: Distribution Of Drugs Per Prescription

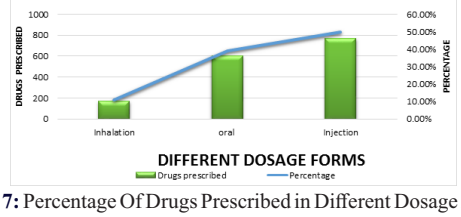

Figure 7: Percentage Of Drugs Prescribed in Different Dosage Forms

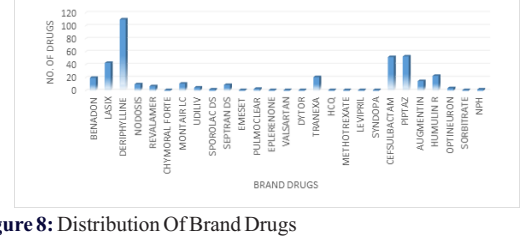

Figure 8: Distribution Of Brand Drugs

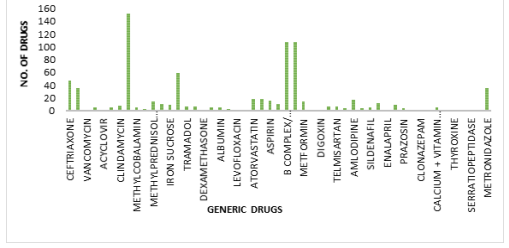

Figure 9: Distribution Of Generic Drugs

Table 1: Various Classes of Drugs Prescribed for Each Respiratory Disease

DRUGS	ACUTE PULMONARY EDEMA	ASPIRATION PNEUMONIA	COPD WITH AE	COPD WITH OTHER DISEASES	COPD WITH CORPULMONALE	PNEUMOTHORX	CONSOLIDATION	FIBROSIS	HEMOPTYSIS	PNEUMONIA	BRONCHIAL ASTHMA	OAD	PLEURAL EFFUSION	BRONCHIECTASIS	LRTI	EMPHYSEMA
ANTIBIOTICS	15	5	17	23	5	12	16	19	21	36	8	16	15	17	10	2
BRONCHODILATORS	9	0	15	19	7	19	7	12	21	27	7	10	15	14	5	2

ACIDREDUCING AGENT	13	3	11	16	5	11	7	12	15	3	7	13	10	9	7	3
ANTIDIABETIC AGENT	7	2	16	2	3	2	4	4	6	6	2	3	3	9	5	0
INHALED CORTICOSTEROID	1	1	3	5	3	6	4	9	6	10	7	8	0	2	4	2
IV CORTICOSTEROID	0	0	10	5	1	3	1	1	0	2	5	6	0	0	1	0
ANTIHYPERLIPIDEMIC AGENT	4	1	4	6	4	0	1	2	1	1	1	0	0	0	0	0
ANTIPLATELET AGENT	1	2	3	7	4	0	1	1	0	0	0	0	0	0	1	0

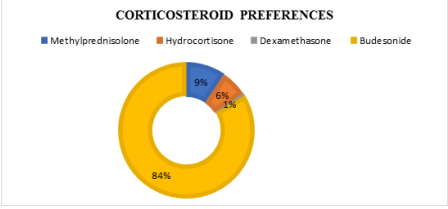

Figure 10: Corticosteroid Preferences in Respiratory Diseases

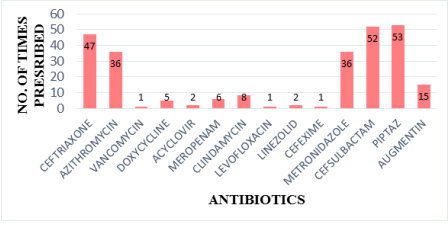

Figure 11: Distribution Of Commonly Prescribed Antibiotics

Table 2: Distribution Of Drugs Prescribed as Adjunctive Therapy

ADJUNCTIVE THERAPY	NO. OF DRUGS	PERCENTAGE (%)
PANTOPRAZOLE	152	50
METHYLCOBALAMINE	5	1.7
B COMPLEX & VITAMIN C	108	35.5
IRON FOLIC ACID	12	3.94
CALCIUM + VITAMIN D3	6	1.97
ZINC	2	0.65
THIAMINE	6	1.97
OPTINEURON	4	1.31
IRON SUCROSE	9	2.96
TOTAL	304	100

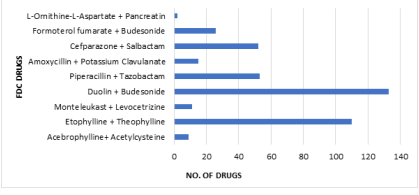

Figure 12: Number Of Fixed Dose Combinations (FDC) Prescribed

Table 3: ABG Analysis Among Study Population

PARAMETER	ABG (MEAN ± SD)
pH	7.38 ± 0.10
PCO2	38.76 ± 16.11
PO2	102.06 ± 72.81

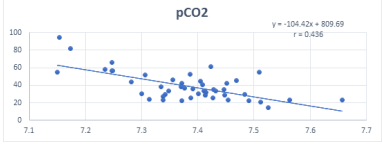

Figure 13a: Correlation of pH with pCO2

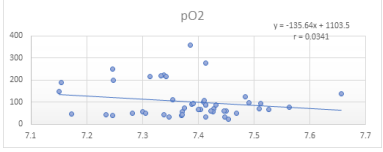

Figure 13b: Correlation of pH with pO2

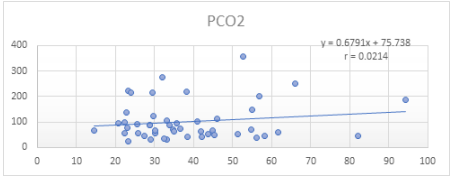

Figure 13c: Correlation Of pCO2 with pO2

WHO Indicators:

A total of 1681 drugs were prescribed in total 162 patients. So, the average number of drugs per encounter is 2.56±1.23. Minimum 6 drugs prescribed and maximum 17 drugs prescribed. Among this, 97 (59.87%) included 11–15 drugs, followed by 60 (37.03%) with 6–10 drugs. Only 4 prescriptions (2.5%) contained more than 15 drugs, while just 1 prescription (0.6%) had 1–5 drugs.

Table 4: Average Number of Drugs Acting on Respiratory System

TOTAL NUMBER OF DRUGS ACTING ON RESPIRATORY SYSTEM PRESCRIBED	TOTAL NUMBER OF PRESCRIPTIONS	AVERAGE NUMBER OF DRUGS ACTING ON RESPIRATORY SYSTEM PER PRESCRIPTION
416	162	2.56 ± 1.23

Table 5: Analysis Of Drugs Prescribed in Respiratory Patients with Associated Illness

DRUGS PRESCRIBED	NO. OF DRUGS (n=1681)	PERCENTAGE (%)
DRUGS ACTING ON RS	416	24.74
ANTIBIOTICS	265	15.76
DRUGS ACTING ON GIT	152	9.04
NUTRITIONAL SUPPLEMENTS	152	9.04
ANTIHISTAMINES	11	0.65
DRUGS ACTING ON CVS	126	7.5
OTHERS	559	33.25
TOTAL	1681	100

Table 6: Values of WHO Prescribing Indicators Obtained in the Study

WHO PRESCRIBING INDICATORS	VALUES
Total number of prescriptions	162
Total number of drugs prescribed	1681
Average number of drugs per prescription	10.37%
Percentage of drugs prescribed by generic name	31.48%
Percentage of patients with an injection prescribed	20.98%
Percentage of patients prescribed with antibiotics	8.025%

DISCUSSION:

Our study analyzed 162 patients with respiratory diseases after getting informed consent form. The demographic details and prescribing pattern of drugs were collected in a suitable data collection form. This prospective observational study provides valuable insights into the prescribing trends in patients with respiratory diseases at a tertiary care hospital. The filled forms were analyzed to evaluate drug therapy practices in patients with respiratory diseases. A total of 162 patients were included, with a male predominance (72.22%), which aligns with previous studies such as Beg et al. (2017) [7], who reported a male proportion of 56.41%. The higher male incidence may be attributed to increased exposure to occupational hazards, smoking, and environmental pollutants among males in the studied region.

Most patients were aged between 61–70 years (22.83%), followed by

those aged 51–60 years (22.22%). These findings are consistent with earlier studies, which have shown that respiratory illnesses, particularly COPD and pneumonia, are more prevalent in the elderly due to age-related decline in pulmonary function and immunity.

In terms of comorbidities, pulmonary tuberculosis (26.72%) was most common, followed by diabetes mellitus (24.43%) and hypertension (23.66%). This is somewhat consistent with the disease distribution in the study by Beg et al. (2017) [7] where pulmonary tuberculosis was also among the leading conditions (30.76%). The coexistence of chronic conditions such as DM and HTN can complicate the management of respiratory illnesses, highlighting the need for individualized therapy. Pneumonia (16.05%) was the most frequently diagnosed condition, followed by COPD with acute exacerbation (9.88%) and acute pulmonary edema (8.63%). In contrast, Desai B et al. [6] found COPD to be the most prevalent (39.68%). These differences may reflect variations in local epidemiological patterns or diagnostic emphasis.

Polypharmacy was evident, with 59.87% of prescriptions containing 11–15 drugs. This finding is significantly lower than the average of 8.32 drugs per prescription reported by Beg et al. (2017) [7]. Such polypharmacy raises concerns regarding potential drug interactions, increased risk of adverse drug reactions, and patient non-compliance, especially in elderly patients with multiple comorbidities.

Regarding the route of drug administration, injectable drugs were the most used (49.93%), followed by oral (39.14%) and inhalational forms (10.93%). These findings are like those of Hadia et al., (2021) [5] where parenteral formulations were predominant (55.73%). The high use of injectable in the present study may be indicative of acute exacerbations or severe respiratory conditions necessitating rapid therapeutic action. Most of the drugs are prescribed by generic name helps the hospital pharmacy to have better inventory control and often more economic than the branded ones. Brand-name prescribing was predominant, with drugs like Deriphylline, Piptaz, and Lasix frequently used. Although a precise percentage of brand versus generic prescribing was not calculated, this trend parallels the 88.72% brand-name prescribing reported by Beg et al. (2017) [7] Also, the study conducted by Sumanth et al., (2022) [4] concluded that 42.71% drugs were prescribed be their generic name which differs from this present study. Such practices may reflect prescriber habits or pharmaceutical marketing influences but can impact cost-effectiveness and accessibility. Budesonide (83.65%) was the most prescribed corticosteroid, signifying a strong preference for inhalational therapy over systemic corticosteroids, which were used sparingly. This finding was similar with Veetill et al., (2014) [8] study where 25% of patients were received Budesonide as corticosteroid inhaler. This rational use of inhaled corticosteroids is beneficial in reducing systemic side effects and aligns with guideline-based management of asthma and COPD.

Among antibiotics, Piperacillin + Tazobactam (20%) and Cefoperazone + Sulbactam (19.62%) were most prescribed. This is in line with the findings from Naik H G et al., (2013) [9] where Ceftriaxone was frequently used. However, our study reported minimal use of Levofloxacin (0.37%), which was the one of the commonly prescribed antibiotics in their study. This shift may be due to changing resistance patterns or prescriber preferences. Adjunctive therapies were widely used, especially Pantoprazole (50%) and B Complex/Vitamin C (35.5%). This is like Hadia et al., (2021) [5] study, where the pantoprazole (23.6%) prescribed the most. Their frequent use suggests efforts to mitigate gastrointestinal side effects and support nutritional status, particularly in patients on prolonged corticosteroid or antibiotic therapy.

Paracetamol was the most prescribed antipyretic (107 out of all prescriptions examined). These results were comparable to those of the study by Sumanth et al., (2022) [4] in which paracetamol was the sole antipyretic administered for fever and determined to be the most suitable because fever was a symptom of most respiratory disorders. Fixed Dose Combinations (FDCs) were frequently prescribed, particularly Duolin + Budesonide (32.36%) and Etophylline + Theophylline (26.76%). This differs from Sumanth et al., (2022) [4] who reported Piperacillin + Tazobactam as the most common FDC. The preference for bronchodilator-steroid combinations in our study suggests a focus on managing obstructive airway conditions and asthma-related symptoms. In our study, statistically significant correlations were found between pH, pO2 and pCO2 in ABG analysis which is performed for clinical evaluation.

In our study from total 1681 drugs prescribed in 162 patients, majority of drugs 416 were acting on respiratory diseases. So, average number of drugs per encounter was 10.37±2.32. the main purpose is to measure the polypharmacy. Average number of drugs per prescription is an important index of scope for review and educational intervention in drug therapy practices. This finding is like Desai B et al., (2023) [6], it is preferable to keep the mean number of drugs per prescription as low as possible. The current study found that individuals with respiratory conditions who were also prescribed multivitamins and other medications had a greater average number of prescriptions overall. Polypharmacy is highly prevalent in respiratory disease patients, exposing them not only to adverse effects but also to the drug interactions, increased cost of therapy and non-compliance. Drug therapy practices is an effective way to increase the appropriateness of the therapy thereby minimizing the polypharmacy and improving the rational use of drugs.

CONCLUSION:

This study concludes that combination medicines are frequently used to address symptoms in medication therapy practices for respiratory diseases. Beta-2 agonists, xanthine derivatives, and corticosteroids are commonly used, especially for COPD with AE and pneumonia.

Most medications were administered in compliance with WHO list recommendations, even if they were used based on physician preference and availability. Many patients were not following the conventional treatment standards, even though the physicians were providing treatment to them. The majority of patients were using the hospital's free prescription medications rather than purchasing any that were not available there. This study does, however, highlight possible problems such as polypharmacy and a significant reliance on adjuvant therapies and antibiotics. Improving treatment effectiveness involves optimizing polypharmacy and making sure that antibiotics are used appropriately.

Acknowledgement

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