ORIGINAL ARTICLE

Treatment Patterns, Use of Cough Formulations, and Antibiotics in the Management of Acute Cough in Indian Adults and Elderly: A Real-world Study

Agam Vora[1], Surinder Kumar Jindal[2], Priti Thakor[3], Harshad Malve[4], Roshni Panchal[5*]

Abstract

Background and objective: The management of acute cough has a range of treatment strategies, including prescription and nonprescription medicines, which may contain one or more active ingredients such as fixed-dose combinations (FDCs) and potentially the use of antibiotics. This study aims to analyze recommendation and prescription patterns for cough, focusing on the use and/or recommendation of antibiotics, and the single or FDCs of medicines.

Methodology: Electronic medical records (EMR) data from 2017 to 2023 of the patients of acute cough meeting the study criteria was retrieved and analyzed to understand the types of cough, its treatment pattern, and duration of treatment in Indian adults and elderly.

Results: Antibiotics were frequently prescribed for both the productive cough (adult: 60.33%, elderly: 62.01%) and nonproductive cough (adult: 53.13%, elderly: 52.27%), followed by various FDCs. Overall, dextromethorphan (productive 1.83%, nonproductive 4.37%) and levocloperastine (productive 1.61%, nonproductive 4.31%) were commonly used as monotherapy. Frequent prescriptions of antitussives for nonproductive cough as well as for productive cough were noted both in monotherapy (4.42%) and FDCs (21.84%). Among the antitussive FDCs used for productive cough, chlorpheniramine + dextromethorphan + phenylephrine (38.44%) was the most prescribed, followed by beta-agonists/bronchodilators (18.34%) and antihistamines (4.32%). Antibiotics were prescribed for both the productive (60.33%) and nonproductive (51.93%) cough. Azithromycin (19.10%, 20.65%) and cefpodoxime (5.61%, 6.44%) were the frequently prescribed antibiotic monotherapies for productive and nonproductive cough, respectively. Among the antibiotics, amoxicillin + clavulanic acid and cefpodoxime + clavulanic acid were the commonly prescribed FDCs. The duration of prescription of the cough medications was 3–5 days.

Conclusion: The study gives an overview of current cough management practices in India. The findings highlight the need for educating primary care physicians on the use of standardized guidelines and evidence-based management for common ailments like cough.

Journal of The Association of Physicians of India (2025): 10.59556/japi.73.1028

Introduction

Cough is one of the most common patient complaints encountered by general physicians (GPs), and it often presents challenges of diagnostic uncertainties, proper categorization, and management in primary and secondary care settings.[1] The patient journey for cough management in India involves navigating a complex healthcare landscape, characterized by varying treatment approaches and patient experiences. In India, cough is the second most common symptom in primary care, and its prevalence in primary care ranges from 5 to 10%.[2] Initial self-management is common, with patients frequently using over-the-counter (OTC) medications or home remedies before seeking professional help.[3]

While physicians are familiar with treating different types of cough symptomatically using cough syrups, the best practices still remain unclear.[4] Despite extensive medical literature and clinical experience, there is no definitive remedy for cough, as it generally resolves on its own over time.[5] Nevertheless, healthcare professionals (HCPs), including GPs, recommend OTC medications as the primary treatment for cough, with a study showing 41% of patients with cough and cold purchase OTC preparations.[6,7] Cough preparations are frequently prescribed and used as fixed-dose combinations (FDCs) in clinical practice. This widespread use can require monitoring to mitigate side effects and represent additional treatment costs.[8]

Recently, on April 11, 2025, the Ministry of Health and Family Welfare, India, published a circular regarding the prohibition of 35 FDCs, which also contains four FDCs related to cough management.[9] Earlier, 444 FDCs were banned by the Drugs Controller General of India (DCGI) owing to their irrationality, which also included cough formulations.[10] The World Health Organization (WHO) defines the rational use of medications as providing the appropriate medication to the right patient at the correct dose and duration, at the lowest possible cost to the community.[11] Conversely, irrational medication use involves practices such as polypharmacy, not using the most cost-effective efficacious treatment option, inappropriate antibiotic prescribing, overuse of injectables, failure to adhere to clinical guidelines, and improper self-medication, often with prescription-only drugs. The WHO estimates that over half of all medicines are prescribed or dispensed irrationally, leading to significant consequences such as diminished effectiveness, increased adverse effects, financial strain, and heightened antimicrobial resistance. These issues can reduce the patient's quality of life, resulting in increased costs.[12] Such prescriptions are particularly common in India.

Literature has evidenced a complex picture of cough medication efficacy, suggesting limited pharmacological benefits and potential irrationality. DCGI has previously reviewed various FDCs used for the management of common ailments like cough and cold and found that some of them have possible contradictory therapeutic goals, which may question their use.[13] Many such cough formulation FDCs are still available in India.[14] Notwithstanding concerns about their efficacy and safety, FDCs for cough and cold containing expectorants, antitussives, decongestants, antihistamines, and mucolytics remain widely available in the Indian market.[14,15] However,

[1]Consultant Pulmonologist and Medical Director, Vora Clinic, Mumbai, Maharashtra; [2]Director, Jindal Clinics, Chandigarh; [3]Former Head of Medical Safety Sciences (India) Restorative and Digestive Health (APAC); [4]Medical Head (Self-Care and Operations); [5]Medical Lead, Medical Safety Sciences, JNTL Consumer Health (India) Private Limited, Mumbai, Maharashtra, India; *Corresponding Author

How to cite this article: Vora A, Jindal SK, Thakor P, *et al.* Treatment Patterns, Use of Cough Formulations, and Antibiotics in the Management of Acute Cough in Indian Adults and Elderly: A Real-world Study. J Assoc Physicians India 2025;73(6):22–30.

not all FDCs have this challenge; some are logical and have shown therapeutic benefits as well. Additionally, irrational prescriptions and dispensing of antibiotics were also reported, despite studies showing a lack of clinical benefits from their usage.[16]

While there is prior evidence indicating a significant presence of irrational cough formulations in India and the role of physicians in perpetuating their use, there is still a lack of comprehensive data on the extent of their use. The insights obtained from this study might shed light on the current practice, preference for therapeutic options, enhance the understanding of cough management in India, and contribute to the development of more scientific and evidence-based practice.

Methodology

Study Design

This retrospective observational study assessed the electronic medical records (EMR) data of adults (≥18 to ≤65 years) and elderly (>65 years) with complaints of cough. The data were evaluated to understand the prescription pattern and the duration of cough medications. Patients with complaints of chronic cough (cough >8 weeks) were excluded.

Data Collection and Variables

Anonymized and aggregated data of patients with cough (2017–2023) retrieved from the HealthPlix EMR database (https://healthplix.com/) were analyzed to understand cough prevalence, prescription patterns, antibiotic usage, and duration of prescription for cough. HealthPlix EMR, launched in 2016, had a significant pool of doctors by the year 2017 who began using the EMR for their day-to-day prescriptions. Hence, the data from 2017 to 2023 were analyzed. The year 2017 may show a lesser number of patients, as fewer doctors had started using the EMR. The data of adult patients with acute cough who visited various doctor specialties were assessed: GPs, consultant physicians (CPs), pulmonologists, and ear, nose, and throat (ENT) specialists. The patients were classified into productive and nonproductive cough, with the following terms for data analysis: patients with complaints of dry cough, unproductive cough, allergic cough, cough with coryza, cough without expectoration, spasmodic cough, dry cough with rhinitis, cough without sputum, cough without bronchospasm, etc., were tagged as nonproductive cough. Patients with complaints of sputum cough, wet cough, cough with expectoration, fever, running nose, wet cough, purulent cough, cough with mucus, etc., were tagged as productive cough. Unspecified cough was tagged for patients whose type of cough was not mentioned.

The ethical clearance for the study was obtained from the Royal Pune Independent Ethics Committee (IEC No. RIPEC121123, dated November 8, 2023).

Statistical Analysis

Statistical analysis for this study was carried out using Stata version 15.1 SE. Categorical data were summarized by doctor specialty using frequency (*n*) and percentages (%). Descriptive statistics were used to summarize the prescription patterns and duration, using frequency (*n*) and percentages (%), for productive and nonproductive cough in adult patients.

Results

Prescription Pattern of Cough Medication (Monotherapy, Combination Therapy, and Antibiotics) for Productive Cough in Adult and Elderly Patients

Antibiotics were commonly recommended in both age categories (adult 60.33%; elderly 62.01%) for productive cough, followed by combination therapy (adult 35.32%; elderly 34.02%). Monotherapy was prescribed to 4.35% of adults and 3.97% of elderly patients. Among the specialties, a higher proportion of patients consulted by CPs and GPs were recommended antibiotics, with a similar trend seen in combination therapy and monotherapy in both adult and elderly patients (Table 1).

Top Molecules of Prescription Pattern of Monotherapy and Combination Therapy of Cough Medication for Productive Cough in Adult Patients

In adult patients with productive cough, monotherapy prescriptions included dextromethorphan hydrobromide, levocloperastine, levodropropizine, and benzonatate. Antitussive combinations were the most frequently prescribed in the combination therapy, followed by beta-agonists (bronchodilator) combinations. The most common antitussive combination prescribed was chlorpheniramine + dextromethorphan + phenylephrine. Among beta-agonist/bronchodilator combinations, bromhexine + guaifenesin + terbutaline was commonly recommended (Table 2).

Prescription Pattern of Monotherapy and Combination Therapy of Cough Medication for Productive Cough in Elderly Patients

In elderly patients with productive cough, levocloperastine was frequently prescribed as monotherapy, followed by dextromethorphan hydrobromide, levodropropizine, and benzonatate. In the combination therapy, beta-agonist (bronchodilator) was commonly recommended, among which bromhexine + guaifenesin + terbutaline was often prescribed. The other combination therapies included antitussives, antihistamines, antihistamine + expectorant, antihistamine + expectorant + mucolytic, and mucolytic + antihistamine (Table 3).

Prescription Pattern of Antibiotics for Productive Cough in Adult and Elderly Patients

Single-molecule antibiotics were commonly prescribed in adult and elderly patients with productive cough, with azithromycin being the most frequent. Other notable antibiotics included cefpodoxime, levofloxacin,

Table 1: Prescription pattern of cough medication (monotherapy, combination therapy, and antibiotics) for productive cough in adult and elderly patients

Age category	*Medications*	*Specialties*				*Total**
		GPs n (%)	*CPs n (%)*	*Pulmonologists n (%)*	*ENT specialists n (%)*	
Adult patients	Monotherapy	1,246 (0.60)	5,746 (2.78)	1,731 (0.84)	215 (0.10)	8,938 (4.35)
	Combination therapy (separated by +)	11,569 (5.60)	53,769 (26.01)	5,966 (2.89)	1,281 (0.62)	72,585 (35.32)
	Antibiotics	21,987 (10.64)	80,736 (39.06)	18,858 (9.12)	2,409 (1.17)	1,23,990 (60.33)
Elderly patients	Monotherapy	177 (0.39)	1,124 (2.45)	484 (1.05)	31 (0.07)	1,816 (3.97)
	Combination therapy (separated by +)	2,173 (4.73)	11,499 (25.05)	1,731 (3.77)	151 (0.33)	15,554 (34.02)
	Antibiotics	4,178 (9.10)	17,927 (39.05)	6,006 (13.08)	244 (0.53)	28,355 (62.01)

% calculated with the total number of adult patients (for adult age-group) and elderly patients (for elderly age-group) as the denominator; *Total frequencies are calculated by adding up the individual frequencies from the mentioned five specialties; CP, consultant physicians; ENT, ear nose, and throat; GP, general physicians; *n*, number of patients

Table 2: Prescription pattern of monotherapy and combination therapy of cough medication for productive cough in adult patients

Single molecule			*Combination of molecules*		
Rank	*Molecule*	*Number of prescriptions, n (%)*	*Rank*	*Molecule*	*Number of prescriptions, n (%)*
				Antitussive combination	**39,755 (21.84)**
1	Dextromethorphan hydrobromide	3,339 (1.83)	1	Chlorpheniramine + dextromethorphan + phenylephrine	15,281 (8.4)
2	Levocloperastine	2,922 (1.61)	2	Chlorpheniramine + levodropropizine	5,328 (2.93)
3	Levodropropizine	1,792 (0.98)	3	Chlorpheniramine + dextromethorphan	4,983 (2.74)
4	Benzonatate	1,386 (0.76)	4	Chlorpheniramine + dextromethorphan hydrobromide + phenylephrine	4,596 (2.52)
			5	Chlorpheniramine + codeine	2,651 (1.46)
				Beta-agonist (bronchodilator)	**33,391 (18.34)**
			1	Bromhexine + guaifenesin + terbutaline	12,268 (6.74)
			2	Ambroxol + guaifenesin + terbutaline	10,064 (5.53)
			3	Bromhexine + guaifenesin + menthol + terbutaline	7,908 (4.34)
			4	Bromhexine + terbutaline	2,127 (1.17)
			5	Bromhexine + guaifenesin + menthol + terbutaline sulphate	674 (0.37)
				Antihistamine	**4,355 (2.39)**
			1	Chlorpheniramine + paracetamol + phenylephrine	4,355 (2.39)
				Antihistamine + expectorant	**2,427 (1.33)**
			1	Ambroxol + desloratadine + guaifenesin	775 (0.43)
			2	Ammonium chloride + diphenhydramine + menthol + sodium citrate	772 (0.42)
			3	Ambroxol + guaifenesin + loratadine	502 (0.28)
			4	Ammonium chloride + chlorpheniramine + noscapine + sodium citrate	378 (0.21)
				Mucolytic + antihistamine	**487 (0.27)**
			1	Ambroxol + levocetirizine	487 (0.27)
				Antihistamine + expectorant + mucolytic	**451 (0.25)**
			1	Ambroxol + guaifenesin + levocetirizine + phenylephrine	451 (0.25)

There might be multiple visits of the same individual due to which the numbers will not match with the prevalence; The top molecules of antitussive and beta-agonist/bronchodilator combinations prescribed are mentioned; The denominator for the percentage is 1,82,024, which is unique to patients with productive cough in the adult age-group

clarithromycin, cefixime, and cefuroxime. Among the combination antibiotics, amoxicillin + clavulanic acid was the most frequently recommended, followed by cefpodoxime + clavulanic acid (Figs 1A and B).

Prescription Pattern of Cough Medication (Monotherapy, Combination therapy, and Antibiotics) for Nonproductive Cough in Adult and Elderly Patients

The prescription patterns for adults with nonproductive cough were similar to those for productive cough, with antibiotics being commonly prescribed (53.13%), followed by combination therapy (38.15%) and monotherapy (8.73%). Elderly patients with nonproductive cough displayed a prescription pattern where antibiotics were commonly recommended (52.27%). The combination of molecules and single-molecule medication was prescribed to 38.80 and 8.93%, respectively. This was evident across the five specialties mentioned in the study among adult and elderly patients. The CPs and GPs prescribed antibiotics more than other specialties. Combination therapy and monotherapy were commonly found in the prescriptions of the CPs and GPs, followed by pulmonologists and ENT specialists (Table 4).

Prescription Pattern of Monotherapy and Combination Therapy of Cough Medication for Nonproductive Cough in Adult Patients

In patients with nonproductive cough, the most frequently prescribed monotherapies were dextromethorphan hydrobromide and levocloperastine, followed by levodropropizine and benzonatate. Among combination therapies, antitussive agents were the most prescribed, followed by beta-agonist/bronchodilator combinations in prescriptions. The most frequently prescribed antitussive combination was chlorpheniramine + dextromethorphan + phenylephrine. Bromhexine + guaifenesin + terbutaline was the most prescribed among beta-agonist (bronchodilator) combinations (Table 5).

Prescription Pattern of Monotherapy and Combination Therapy of Cough Medication for Nonproductive Cough in Elderly Patients

For elderly patients with nonproductive cough, levocloperastine was frequently prescribed as monotherapy, followed by dextromethorphan hydrobromide, benzonatate, and levodropropizine. The prescription of combination molecules reflected the pattern of adult patients, where antitussive combinations were commonly prescribed. Among the antitussive combinations, chlorpheniramine + dextromethorphan + phenylephrine was the most recommended (Table 6).

Prescription Pattern of Antibiotics in Adult and Elderly Patients with Nonproductive Cough

For adult patients and elderly patients with nonproductive cough, single-molecule antibiotics were frequently prescribed, with azithromycin being the most common, followed by cefpodoxime. The most

Table 3: Prescription pattern of monotherapy and combination therapy of cough medication for productive cough in elderly patients

Cough medications					
Single molecule			*Combination of molecules*		
Rank	*Molecule*	*Number of prescriptions, n (%)*	*Rank*	*Molecule*	*Number of prescriptions, n (%)*
1	Levocloperastine	615 (1.4)		**Beta-agonist (bronchodilator)**	**8,964 (20.40)**
2	Dextromethorphan	588 (1.34)	1	Bromhexine + guaifenesin + terbutaline	3,506 (7.98)
3	Levodropropizine	417 (0.95)	2	Ambroxol + guaifenesin + terbutaline	2,424 (5.52)
4	Benzonatate	315 (0.72)	3	Bromhexine + guaifenesin + menthol + terbutaline	2,280 (5.19)
5	Ivy leaf extract	94 (0.21)	4	Bromhexine + terbutaline	643 (1.46)
			5	Bromhexine + guaifenesin + menthol + terbutaline	111 (0.25)
				Antitussive combination	**8,085 (18.40)**
			1	Chlorpheniramine + dextromethorphan + phenylephrine	3,131 (7.13)
			2	Chlorpheniramine + levodropropizine	1,083 (2.47)
			3	Chlorpheniramine + dextromethorphan	1,036 (2.36)
			4	Chlorpheniramine + dextromethorphan + phenylephrine	986 (2.24)
			5	Chlorpheniramine + codeine	481 (1.09)
				Antihistamine	**616 (1.40)**
			1	Chlorpheniramine + paracetamol + phenylephrine	616 (1.4)
				Antihistamine + expectorant	**592 (1.35)**
			1	Ambroxol + desloratadine + guaifenesin	189 (0.43)
			2	Ambroxol + guaifenesin + loratadine	185 (0.42)
				Antihistamine + expectorant + mucolytic	**144 (0.33)**
			1	Ambroxol + guaifenesin + levocetirizine + phenylephrine	144 (0.33)
				Mucolytic + antihistamine	**110 (0.25)**
			1	Ambroxol + levocetirizine	110 (0.25)
				Expectorant	**64 (0.15)**
				Ammonium chloride + sodium citrate	64 (0.15)

There might be multiple visits of the same individual due to which the numbers will not match the prevalence; Top molecules of beta-agonists/bronchodilators, antitussives, and antihistamine + expectorant combinations are mentioned; The denominator for the percentage is 43,935, which is unique for patients with productive cough in elderly age-group

Table 4: Prescription pattern for nonproductive cough in adult and elderly patients

Age category	*Medications*	*Specialty*				*Total* n (%)*
		GPs n (%)	*CPs n (%)*	*Pulmonologists n (%)*	*ENT specialists n (%)*	
Adult patients	Monotherapy	5,407 (1.98)	14,569 (5.34)	2,223 (0.81)	1,366 (0.50)	23,565 (8.73)
	Combination therapy (separated by +)	25,183 (9.22)	66,615 (24.39)	6,158 (2.26)	5,065 (1.85)	1,03,021 (38.15)
	Antibiotics	38,427 (14.07)	88,457 (32.39)	11,124 (4.07)	5,482 (2.01)	1,43,490 (53.13)
Elderly patients	Monotherapy	497 (1.41)	1,925 (5.48)	527 (1.50)	162 (0.46)	3,111 (8.93)
	Combination therapy (separated by +)	2,527 (7.19)	9,400 (26.74)	1,164 (3.31)	429 (1.22)	13,520 (38.80)
	Antibiotics	3,655 (10.40)	11,903 (33.85)	2,231 (6.35)	422 (1.20)	18,211 (52.27)

% calculated with the total number of adult patients (for the adult age-group) and elderly patients (for the elderly age-group) as the denominator; *Total frequencies are calculated by adding up the individual frequencies from the mentioned five specialties; CP, consultant physicians, ENT, ear, nose, and throat; GP, general physicians; *n* is the number of patients

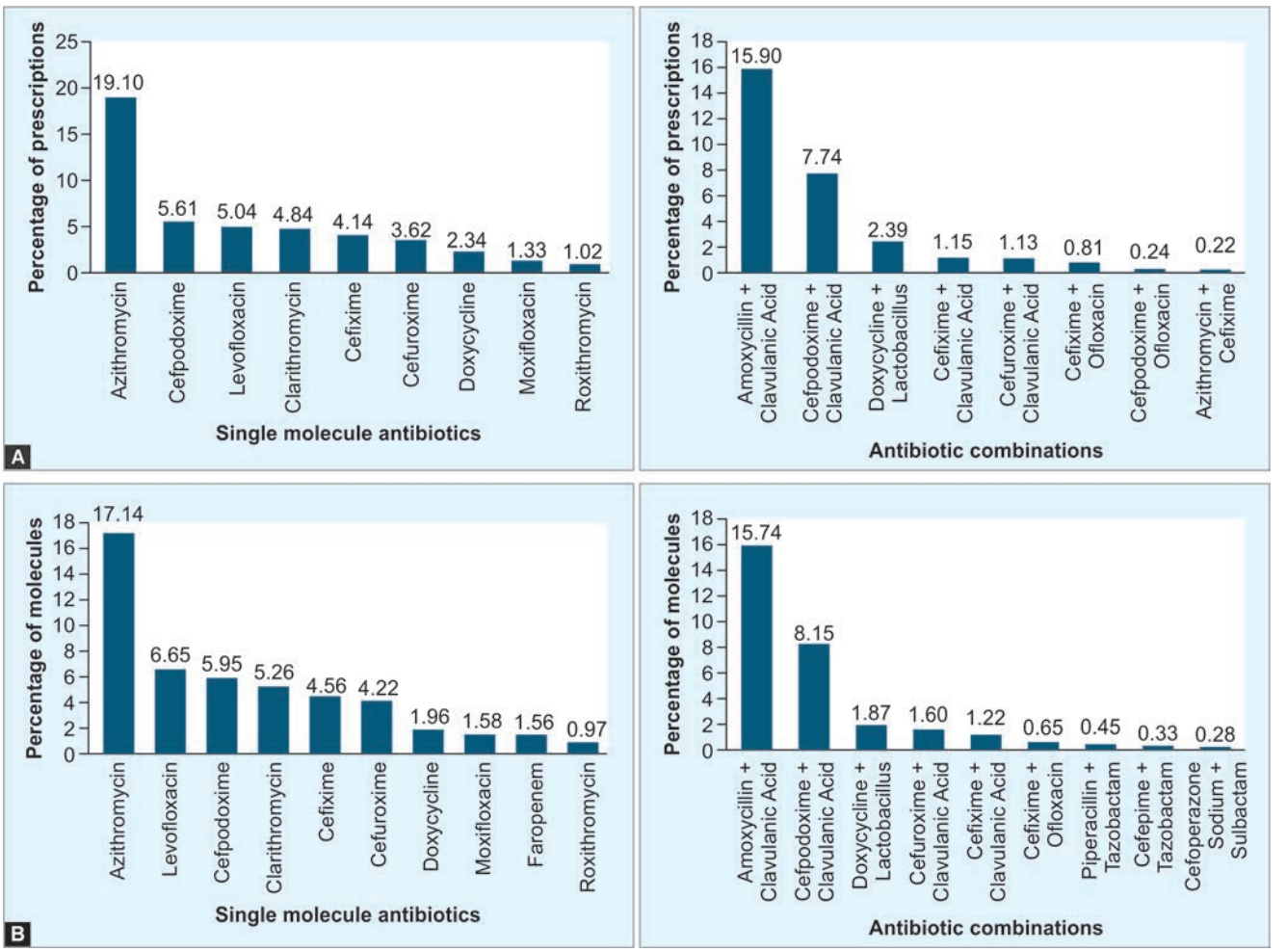
recommended antibiotic combination was amoxicillin + clavulanic acid (Figs 2A and B).

Duration of Prescription of Cough Medication for Productive and Nonproductive Cough in Adult and Elderly Patients

A larger proportion of the adult and elderly patients were recommended cough medication for 3 days, followed by 8–15 days. The prescription duration of 3–5 days was predominantly found in the prescriptions of adult and elderly patients consulted by GPs, CPs, and ENT specialists. Recommendation of cough medications for 8–15 days and >15 days was found frequently among the patients visiting pulmonologists. The prescription of medications for unspecified days was found in a sizeable number of patients of GPs (Figs 3 and 4).

Discussion

Efforts to alleviate cough symptoms are reflected in the significant spending on OTC cough medications.[5] While managing symptoms may be appropriate in certain cases, a persistent cough should prompt a thorough investigation.[17] Health practitioners often focus on understanding different types of coughs; however, the effective rationale



Figs 1A and B: The prescription pattern of antibiotics for productive cough in (A) adult patients and (B) elderly patients

Table 5: Prescription pattern of monotherapy and combination therapy of cough medication for nonproductive cough in adult patients

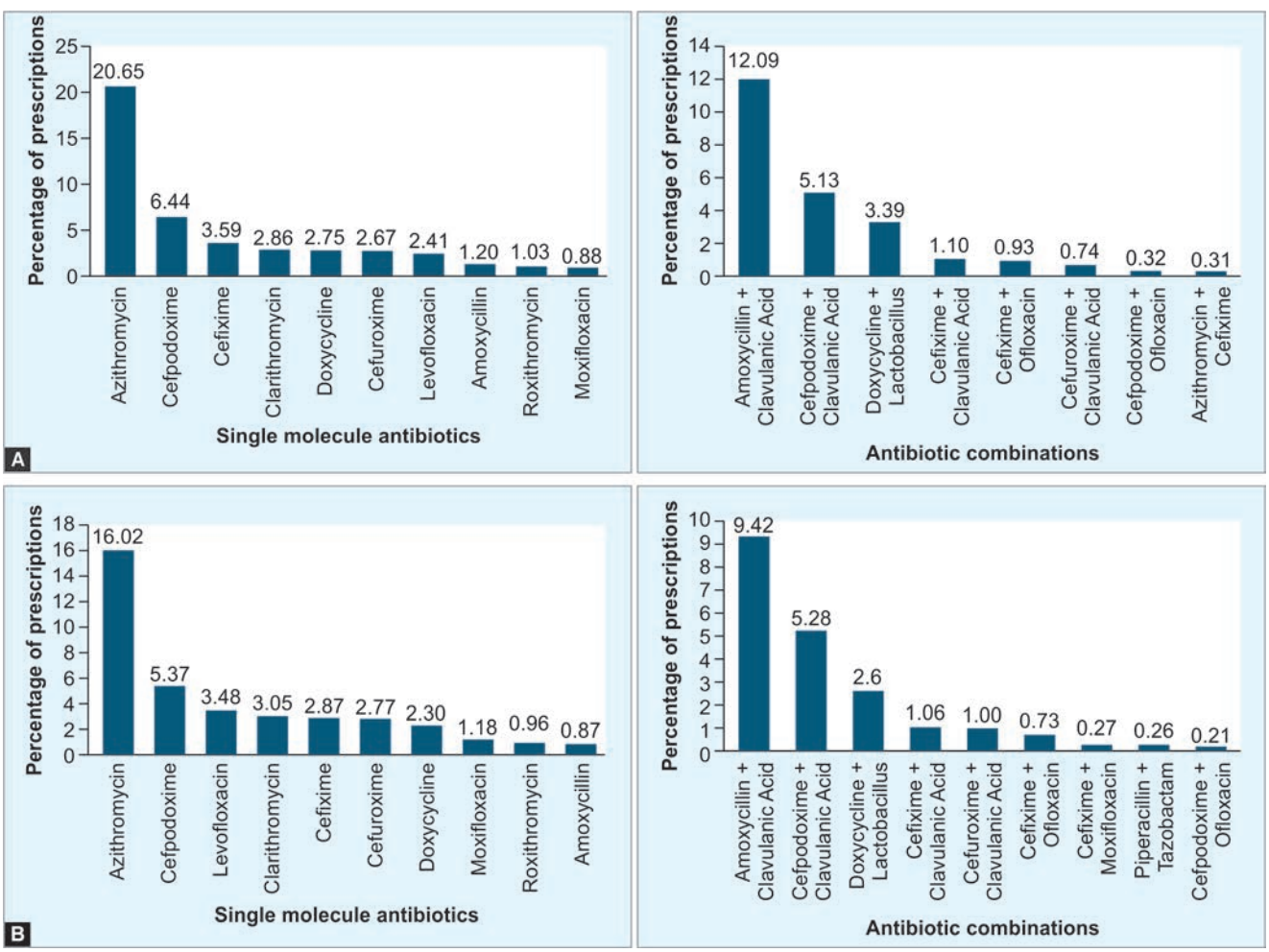
Single molecule			*Combination of molecules*		
Rank	*Molecule*	*Number of prescriptions, n (%)*	*Rank*	*Molecule*	*Number of prescriptions, n (%)*
1	Dextromethorphan	10,289 (4.37)		**Antitussive combination**	**97,093 (41.19)**
2	Levocloperastine	10,150 (4.31)	1	Chlorpheniramine + dextromethorphan + phenylephrine	40,162 (17.04)
3	Levodropropizine	3,653 (1.55)	2	Chlorpheniramine + levodropropizine	13,244 (5.62)
4	Benzonatate	2,764 (1.17)	3	Chlorpheniramine + dextromethorphan	10,137 (4.3)
			4	Chlorpheniramine + codeine	8,765 (3.72)
			5	Chlorpheniramine + dextromethorphan	5,255 (2.23)
			6	Chlorpheniramine + dextromethorphan + phenylephrine	4,298 (1.82)
				Beta-agonist (bronchodilator)	**11,128 (4.72)**
			1	Bromhexine + guaifenesin + terbutaline	3,713 (1.58)
			2	Ambroxol + guaifenesin + terbutaline	3,351 (1.42)
			3	Bromhexine + guaifenesin + menthol + terbutaline	3,247 (1.38)
			4	Bromhexine + terbutaline	817 (0.35)
				Antihistamine	**6,521 (2.77)**
			1	Chlorpheniramine + paracetamol + phenylephrine	6,521 (2.77)
				Mucolytic + antihistamine	**1,504 (0.64)**
			1	Ambroxol + levocetirizine	1,504 (0.64)
				Antihistamine + expectorant	**1,371 (0.58)**
			1	Ammonium chloride + chlorpheniramine + noscapine + sodium citrate	767 (0.33)
			2	Ammonium chloride + diphenhydramine + menthol + sodium citrate	604 (0.26)
				Antihistamine + expectorant + mucolytic	**604 (0.26)**
			1	Ambroxol + guaifenesin + levocetirizine + phenylephrine	604 (0.26)

There might be multiple visits of the same individual due to which the numbers will not match with the prevalence; The top molecules of antitussive combinations prescribed are mentioned; The denominator for the percentage is 2,35,700, which is unique to patients with nonproductive cough in the adult age-group

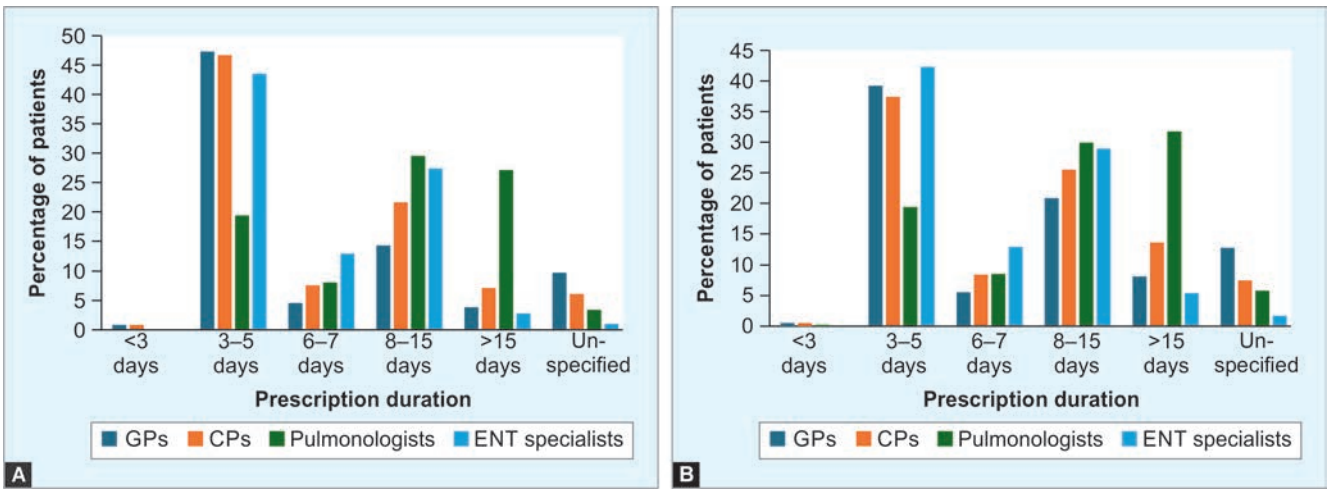
Table 6: Prescription pattern of monotherapy and combination therapy for nonproductive cough in elderly patients

Single molecule			*Combination of molecules*		
Rank	*Molecule*	*Number of prescriptions, n (%)*	*Rank*	*Molecule*	*Number of prescriptions, n (%)*
1	Levocloperastine	1,470 (4.24)		**Antitussive combination**	**12,133 (35.02)**
2	Dextromethorphan	1,113 (3.21)	1	Chlorpheniramine + dextromethorphan + phenylephrine	5,203 (15.02)
3	Benzonatate	525 (1.52)	2	Chlorpheniramine + levodropropizine	1,757 (5.07)
4	Levodropropizine	466 (1.35)	3	Chlorpheniramine + dextromethorphan	1,147 (3.31)
5	Ivy leaf extract	72 (0.21)	4	Chlorpheniramine + codeine	849 (2.45)
			5	Chlorpheniramine + dextromethorphan	685 (1.98)
				Beta-agonist/bronchodilator	**2,478 (7.15)**
			1	Bromhexine + guaifenesin + terbutaline	892 (2.57)
			2	Bromhexine + guaifenesin + menthol + terbutaline	655 (1.89)
			3	Ambroxol + guaifenesin + terbutaline	646 (1.86)
			4	Bromhexine + terbutaline	223 (0.64)
			5	Ambroxol + guaifenesin + levosalbutamol	62 (0.18)
				Antihistamine	**607 (1.75)**
			1	Chlorpheniramine + paracetamol + phenylephrine	607 (1.75)
				Mucolytic + antihistamine	**146 (0.42)**
			1	Ambroxol + levocetirizine	146 (0.42)
				Antihistamine + expectorant	**152 (0.44)**
			1	Ammonium chloride + chlorpheniramine + noscapine + sodium citrate	100 (0.29)
			2	Ammonium chloride + diphenhydramine + menthol + sodium citrate	52 (0.15)
				Antihistamine + expectorant + mucolytic	**98 (0.28)**
			1	Ambroxol + guaifenesin + levocetirizine + phenylephrine	98 (0.28)

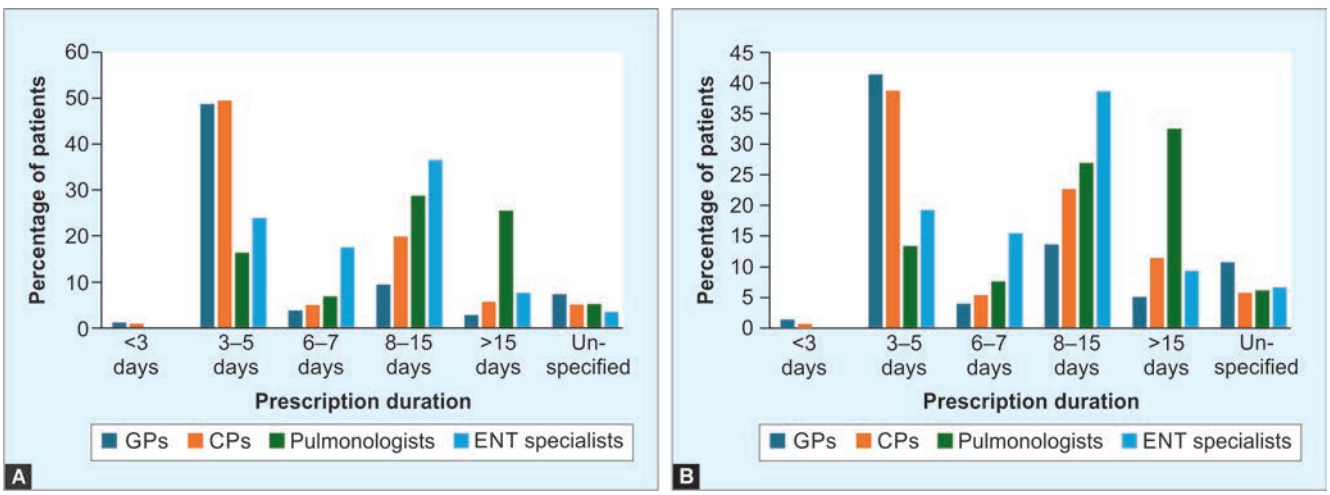
There might be multiple visits of same individual due to which the numbers will not match the prevalence; The top molecules of antitussive combinations prescribed are presented; The denominator for the percentage is 34,643, which is unique to patients with nonproductive cough in the elderly age-group



Figs 2A and B: The prescription pattern of antibiotics for nonproductive cough in (A) adult patients and (B) elderly patients



Figs 3A and B: Duration of prescription of cough medications for productive cough in (A) adult and (B) elderly patients. CP, consultant physicians; ENT, ear, nose, and throat; GP, general physicians



Figs 4A and B: Duration of prescription of cough medications for nonproductive cough in (A) adult and (B) elderly patients. CP, consultant physicians; ENT, ear, nose, and throat; GP, general physicians

for managing cough remains unclear. Butler et al. reported that approximately 53% of acute cough patients in Europe were given antibiotics, despite the prevalence of self-limiting viral infections.[18] This prescribing pattern may be influenced by a clinician's perception of illness severity, perceived benefits, patient expectations, anticipations, and requests, reflecting contextual factors in clinical decision-making.[19] Our study on cough prescription patterns found a similar high frequency of antibiotic prescriptions for adults and elderly patients with both productive and nonproductive coughs. Wong et al. highlight the dominance of antibiotic prescriptions among private primary care physicians versus public primary care physicians.[20] The use of antibiotics and presence of infection in those patients' medical records was beyond the scope of this study.

First-line treatment for cough often includes combination therapy of an antihistamine and a decongestant.[21] Roy et al. also documented an increased use of FDCs for cough in the Indian population.[22] Similarly, our study found that combination therapies were commonly prescribed for productive and nonproductive coughs. However, the use of a single-ingredient medication may be more advantageous as it is often associated with a lower risk of adverse drug reactions (ADRs) and drug–drug interactions compared to the use of multiple medications.[23]

In the present study, dextromethorphan hydrobromide and levocloperastine were the most prescribed medications in monotherapy for cough. This finding is supported by a meta-analysis, which indicated the effectiveness of dextromethorphan over placebo in adults with nonproductive or dry cough.[24] The choice of dextromethorphan as the preferred medication for nonproductive cough is due to its effectiveness, its ability to act centrally with sustained antitussive effects, and its safety profile, and it is less likely to have addiction potential, though some cases of recreational use have been reported in the United States.[25] Levocloperastine has also been highlighted for its efficacy in managing cough across all age-groups, outperforming other antitussive agents. Although antitussives are generally recommended for nonproductive cough, our study observed frequent prescriptions of antitussives for productive cough, both as monotherapy and as FDCs, highlighting the need for best practice education. While antitussive agents can effectively suppress nonproductive coughs by altering the cough center's sensitivity, their use for productive cough can possibly slow down the mucus clearance.[26] Studies have also shown that indiscriminate use of FDCs can lead to unnecessary ADRs, increased hospitalization, reduced quality of life, as well as unnecessary financial burden.[11] Further, the prescription of codeine was also documented in our study despite its ban in India due to its abuse, misuse, and addiction liability.[27]

The inconsistent practices of cough management, as highlighted in the present study, may have some knock-on effects, such as an impact on patients' quality of life and suboptimal use of resources that could be redirected to other health priorities, among others.[28] Hence, it is imperative that physicians be cognizant of correct cough categorization and use of cough formulas with the evolving role of various active ingredients for cough treatments. They should also be careful while using combination therapy. Guidelines often advise against routine antibiotic prescribing for acute cough or bronchitis, supported by robust evidence from randomized controlled trials indicating that antibiotics offer no significant benefit and may even pose risks.[29,30] The rampant use of antibiotics are major contributor to antibiotic resistance. The increased antibiotic resistance results in increased healthcare costs, prolonged hospital stays, and both immediate and long-term health complications, leading to significant increases in morbidity and mortality.[31] Despite this evidence, studies have previously reported the increasing trend of using antibiotics for nonspecific respiratory tract infections (RTIs), as documented by Kotwani and Holloway, who observed increased antibiotic prescriptions in acute, uncomplicated RTIs, although more recent data is not available.[32] Our study similarly found frequent recommendations of antibiotics for acute cough in Indian adult patients, which needs to be evaluated for its necessary usage. The COVID-19 pandemic further influenced antibiotic prescribing patterns, which may or may not be rational among adult and elderly patients, with notable variations in usage trends. Most of the management protocols for COVID-19 patients included the use of broad-spectrum antibiotics, and that could be one of the reasons for increased antibiotic usage during and postpandemic. A study in Qatar revealed a decrease in antibiotic prescriptions, with adults being the primary recipients due to stringent state regulations.[33] While in Brazil, azithromycin prescriptions surged during the pandemic, particularly among older males, while other antibiotics like amoxicillin-clavulanate saw declines.[34] However, in India, antibiotic usage further increased during and postpandemic. This needs to be evaluated thoroughly to avoid unwarranted antibiotic exposure postpandemic for conditions like cough.

The duration of cough medication can vary depending on the underlying cause of the cough and the specific medication being used. For acute respiratory infections, cough medications are typically prescribed for a short duration, usually 7–10 days, to provide temporary relief.[35] In the present study, we found that most prescriptions were for a duration of 3–5 days, followed by 6–7 days.

The recent recommendations from the Association of Physicians of India for Primary Care Cough Management in Indian settings strongly recommend cough categorization and rational use of cough formulations for symptom-based management of cough.[36]

This study has some limitations, as the missing data was not analyzed, and there was also an increase in the data as more physicians were added to the EMR over time. As a retrospective data analysis, this study has the inherent bias of including only the available database for the stipulated timeline. The longitudinal data to understand changes in treatment was also not examined in this study.

Conclusion

In conclusion, our study on cough prescription patterns revealed critical insights into current practices and challenges in managing acute cough in Indian adults and elderly. Antibiotics were frequently prescribed for both productive and nonproductive coughs, despite evidence of limited efficacy for many acute respiratory infections. Combination therapies were more common than monotherapies, and inconsistent prescribing practices were observed across specialties. Moreover, our study revealed a preference for shorter prescription durations of 3–5 days.

These findings accentuate the need for enhanced educational initiatives, particularly focusing on cough categorization and evidence-based prescribing practices, with the development of standardized guidelines to simplify medication use. This approach will help us improve patient outcomes.

Acknowledgments

The authors are grateful to HealthPlix (a third-party research agency), which provided support for conducting the literature search, EMR data aggregation and analysis, and medical writing support, which was funded by JNTL Consumer Health (India) Private Limited.

Disclosures

This study was sponsored by JNTL Consumer Health (India) Private Limited, and all authors received honoraria from JNTL Consumer Health (India) Private Limited for participation in the steering committee meeting to discuss the protocol and study results.

Dr Priti is a former employee of JNTL Consumer Health (India) Private Limited. Dr Harshad and Dr Roshni are currently employed with JNTL Consumer Health (India) Private Limited.

Funding

JNTL Consumer Health (India) Private Limited.

Author Contributions

All authors contributed to the development and review of this research manuscript and confirmed that they have read the journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines. All authors met ICMJE criteria, and those who fulfilled those criteria were enlisted as authors. All authors had access to the study data, made the final decision regarding where to publish these data, and approved submission to this journal.

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