ORIGINAL ARTICLE

Prevalence and Clinical Characteristics of Acute Cough in Indian Adults and Elderly Population: A Retrospective Real-world Study

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Abstract

Introduction: Acute cough is a common symptom reflecting the body's protective reflex and is associated with many ailments beyond respiratory conditions. This study aims to assess the prevalence of acute cough, including its categorization, associated complaints, and conditions in adult and elderly patients in real-world settings in India.

Methodology: A retrospective analysis of electronic medical records (EMRs) was conducted to evaluate the prevalence and clinical features of acute cough in adult and elderly patients.

Results: Of 22,51,735 patients with cough complaints in the EMR, 64.06% were adults (18–65 years) and 10.39% were elderly patients (>65 years). Among the adult patients with cough complaints, nonproductive cough was prevalent in a higher proportion (16.34%) than productive cough (12.62%). Additionally, in 71.04% of adults, cough was not categorized and marked as unspecified cough. While in the geriatric population, productive cough (18.78%) was more common than nonproductive cough (14.80%). In 66.42% of geriatric patients, cough remained unspecified. A higher proportion of adult and geriatric patients visited consulting physicians (CPs) and general physicians (GPs). Respiratory tract infection (RTI) was the most frequently associated condition, followed by asthma, bronchitis, and other ailments. Fever and cold were common complaints among patients with both productive and nonproductive cough. This study underscores the substantial prevalence of acute cough in adults and the elderly population and the need for targeted strategies to manage it effectively.

Conclusion: While cough categorization will help in symptom-targeted management approach for productive or nonproductive cough, the majority of cough patients are not yet categorized and are referred to as unspecified cough. This challenge persists irrespective of specialty of the doctors with a direct impact on patient outcomes.

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Introduction

Cough, indicated by forceful expulsion of air from the lungs with a distinct sound, is a ubiquitous symptom across various diseases, reflecting the body's immune response.[1,2] While primarily serving as a protective reflex, it manifests in many ailments beyond respiratory conditions, indicating its fundamental role in health.[3] The prevalence of cough globally is 9.6%, and in India, it ranges from 5 to 10%.[4] This symptom induces not only significant distress but also imposes substantial healthcare costs, encompassing outpatient visits and medication expenses.[5] Productive and nonproductive cough, denoted as "wet" and "dry" cough, respectively, are prevalent types, each associated with marked characteristics such as the presence or absence of sputum production.[6] These manifestations underscore various respiratory disorders such as asthma, allergic rhinitis, chronic obstructive pulmonary disease (COPD), and rhinosinusitis, significantly compromising a patient's quality of life and contributing to the overall burden of recurrent illnesses.[7,8] In the Indian scenario, Pore et al.[9] had depicted that the predominantly associated conditions with dry cough included respiratory infections, allergies, and exposure to pollution, with many patients being smokers. Similarly, the key underlying conditions of wet cough were bronchitis and bronchiectasis.[10] However, challenges in precise cough categorization persist due to inconsistencies in definitions and classifications, posing diagnostic and management hurdles, particularly in countries such as India.[11]

The duration of cough for <3 weeks is classified as acute cough, while for 3–8 weeks, it is subacute, and if it persists for >8 weeks, it is a chronic cough.[12] An acute cough, usually benign and self-limiting, lasts about 14 days on average. Acute cough contributes to over 50% of new patient visits in primary care and hospitalizations, posing significant implications for the patient's families and physicians. Moreover, it carries a notable burden from a pharmacoeconomic perspective.[13]

Acute cough should not be regarded merely as a symptom of acute respiratory infections but as a possible manifestation of long-standing, treatable cough risk factors.[14] An Indian case study reported 2,828 million episodes of upper respiratory tract infection (URTI), out of which 40% suffered from acute cough.[15] It was seen that during the COVID-19 pandemic, patients with previously diagnosed respiratory conditions were found to have feeble maintenance and were mostly subjected to critical care.[3] This shows that an extensive study and survey on the prevalence of various types of cough among the Indian population are indispensable as it would help to identify the predisposing factors and lessen the burden encountered during pandemics.

The current study assesses the prevalence of acute cough, including its categorization, complaints, and associated conditions in adult and elderly patients in a real-world setting.

Methodology

Study Design

This retrospective observational study assessed the electronic medical records (EMRs) data of Indian patients with complaints of cough at baseline to understand the prevalence and clinical characteristics of acute cough. Data of the adult patients (≥18 to ≤65 years old) and geriatric patients (>65 years) were analyzed. The patient records which mentioned chronic cough or duration of cough >8 weeks or related terms were excluded from the study. The primary outcome was to evaluate the prevalence and type of acute cough among adults and elderly.

Data Collection and Variables

Anonymized and aggregated data of the patients with cough from January 2017 to December 2023 were retrieved from the

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HealthPlix EMR database (https://healthplix.com/) for analysis. Since HealthPlix started its EMR in 2016, and by 2017, a significant pool of doctors started using HealthPlix for their day-to-day prescription; the duration from 2017 to 2023 was considered for data collection. The year 2017 showed a lesser number of patients, as only fewer doctors started using the EMR. The data were analyzed to understand the incidence of cough, the prevalence of different cough categories, symptoms, and associated conditions of acute cough in adult patients and for various specialties [general physicians (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 in nonproductive cough. Patients with complaints of cough with sputum, wet cough, cough with expectoration, cough with running nose, purulent cough, cough with mucus, etc., were tagged in productive cough. Unspecified cough was tagged for patients who did not have the cough type mentioned as wet or dry or using any of the above-mentioned terminologies on the EMR. Ethics Committee (EC) approval for the study was obtained from the Royal Pune Independent Ethics Committee (IEC No.: RIPEC121123).

Statistical Analysis

Statistical analysis for this study was carried out using Stata version 15.1 SE. Categorical data were summarized by age groups and doctor specialty using frequency (*n*) and percentages (%).

Results

Incidence of Acute Cough

Of 22,51,735 patients with cough complaints in the EMR database, 64.06% (14,42,452 patients) were adults. Among these adult patients with cough complaints, nonproductive cough was more common (16.34%) than productive cough (12.62%). Unspecified cough was reported in almost three-fourths of patients (71.04%) (Fig. 1). Most adult patients consulted CPs, followed by GPs and pulmonologists (Table 1).

On the contrary, among the elderly patients (2,33,999 patients, 10.39%) with cough complaints, productive cough (18.78%) was more prevalent than nonproductive cough (14.80%). Unspecified cough was present in 66.42% of the geriatric patients. Like adult patients, the geriatric patients also majorly consulted the CPs (Table 2).

Prevalence of Cough from 2017 to 2023 in Adult and Elderly Patients

The year-wise analysis of the overall prevalence of cough in adult and elderly patients from 2017 to 2023 among the specified specialties revealed a consistent increase across the years, with the incidence peaking in 2023. The CPs were the most

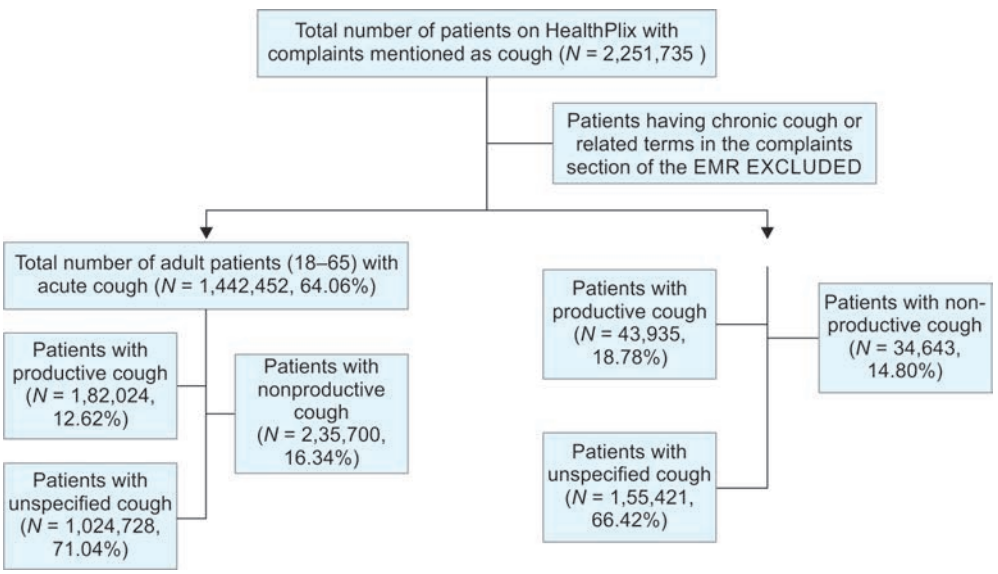


Fig. 1: Patient disposition and prevalence of acute cough

Table 1: Overall incidence of acute cough in adult patients

Category	*Specialties*				*Total n (%)*
	GPs (3,060) n (%)	*CPs (2,675) n (%)*	*Pulmonologists (355) n (%)*	*ENT specialists (299) n (%)*	
Overall patients in the EMR with complaints mentioned as cough	7,37,055	10,81,830	1,79,111	52,546	22,51,735*
Total number of adult patients with cough complaints	4,50,773 (61.16)[a]	8,22,006 (75.98)[a]	1,30,746 (73.00)[a]	38,927 (74.08)[a]	14,42,452 (64.06)[a]
Adult patients with productive cough	34,207 (7.59)[b]	1,13,368 (13.79)[b]	30,552 (23.37)[b]	3,897 (10.01)[b]	1,82,024 (12.62)[b]
Adult patients with nonproductive cough	62,827 (13.94)[b]	1,40,252 (17.06)[b]	22,822 (17.46)[b]	9,799 (25.17)[b]	2,35,700 (16.34)[b]
Adult patients with unspecified cough	3,53,739 (78.47)[b]	5,68,386 (69.15)[b]	77,372 (59.18)[b]	25,231 (64.82)[b]	10,24,728 (71.04)[b]

*Total number of patients with cough complaints attended by doctors of all specialties in the EMR; [a]Percentages are calculated by taking the number of overall patients in the EMR with complaints mentioned as cough as the denominator; [b]Percentages are calculated by taking the total number of adult patients with cough complaints as the denominator; CPs, consultant physicians; EMR, electronic medical record; ENT, ear, nose and throat; GPs, general physicians; *n*, number of patients

consulted, followed by the GPs in both the patient populations (Fig. 2).

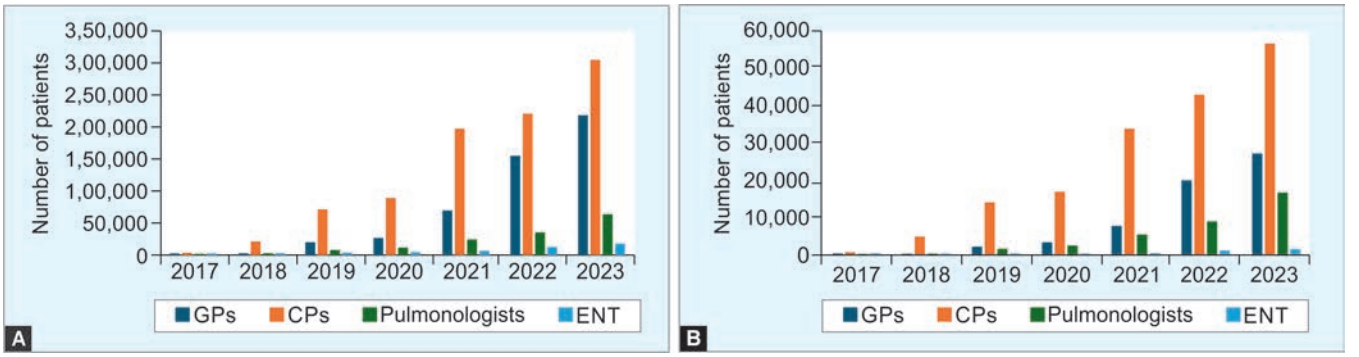
Conditions Associated with Acute Cough in Adult Patients

Productive Cough

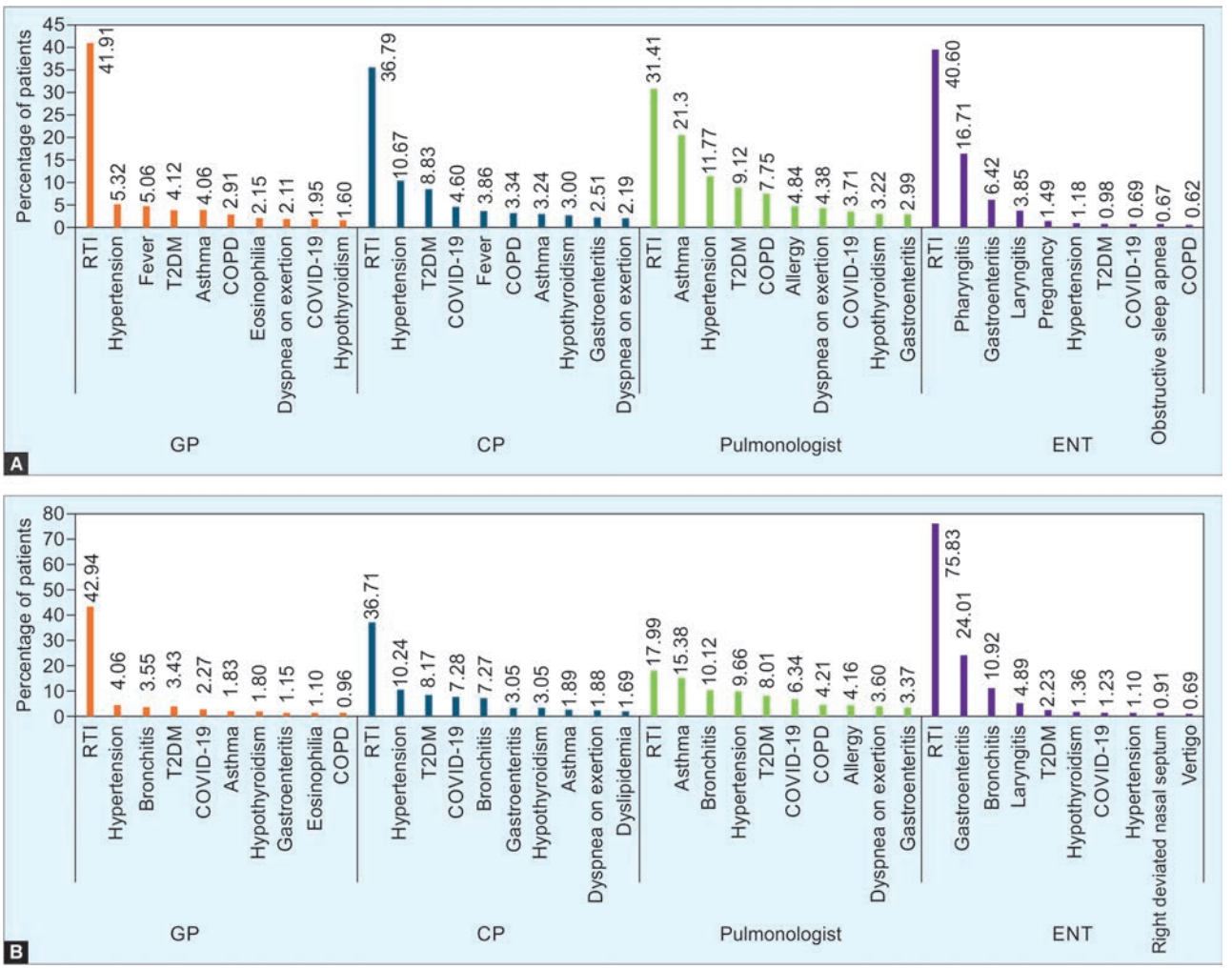
Respiratory tract infection (RTI) was the most common condition among adults with productive cough across all doctor specialties. Apart from RTI, the patients consulted by GPs and CPs commonly reported hypertension and type 2 diabetes mellitus (T2DM). The other associated conditions included fever, asthma, and COPD. For the patients consulted by the pulmonologists, asthma was the second most prevalent condition following RTI. For those treated by ENT specialists, the top conditions included RTI, pharyngitis, gastroenteritis, and laryngitis (Fig. 3A).

Nonproductive Cough

Among the patients with a nonproductive cough, RTI was observed as the most associated condition. Apart from RTI, the patients consulted by GPs presented with



Figs 2A and B: Year-wise trend in the prevalence of acute cough in (A) adult patients and (B) elderly patients from 2017 to 2023 (CPs, consultant physicians; ENT, ear, nose and throat; GPs, general physicians)

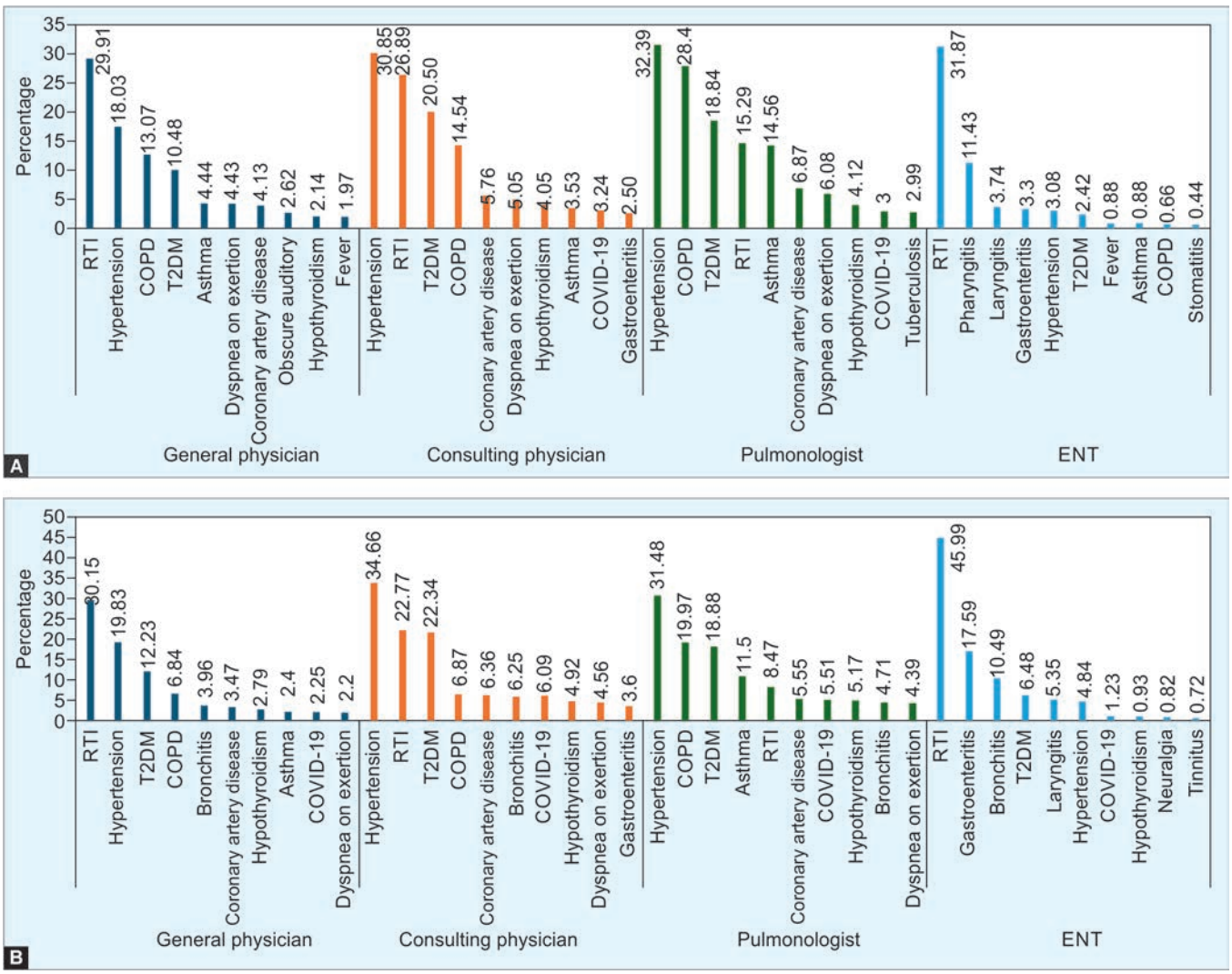


Figs 3A and B: Associated conditions in adult patients with (A) productive cough and (B) nonproductive cough (COPD, chronic obstructive pulmonary disease; CP, consultant physician; ENT, ear, nose and throat; GP, general physician; RTI, respiratory tract infection; T2DM, type 2 diabetes mellitus)

Table 2: Overall incidence of acute cough in elderly patients

Category	*Specialties*				*Total n (%)*
	GPs (3,060) n (%)	*CPs (2,675) n (%)*	*Pulmonologists (355) n (%)*	*ENT specialists (299) n (%)*	
Overall patients in the EMR with complaints mentioned as cough	7,37,055	10,81,830	1,79,111	52,546	22,51,735*
Number of elderly patients with complaints mentioned as cough	54,336 (7.37)[a]	1,44,444 (13.35)[a]	31,276 (17.46)[a]	3,943 (7.50)[a]	2,33,999 (10.39)[a]
Total number of elderly patients with productive cough	7,022 (12.92)[b]	26,731 (18.51)[b]	9,727 (31.10)[b]	455 (11.54)[b]	43,935 (18.78)[b]
Total number of elderly patients with nonproductive cough	6,918 (12.73)[b]	21,997 (15.23)[b]	4,756 (15.21)[b]	972 (24.65)[b]	34,643 (14.80)[b]
Total number of elderly patients with unspecified cough	40,396 (74.34)[b]	95,716 (66.27)[b]	16,793 (53.69)[b]	2,516 (63.81)[b]	1,55,421 (66.42)[b]

*Total number of patients with cough complaints attended by doctors of all specialties in the EMR; [a]Percentages are calculated by taking the number of overall patients in the EMR with complaints mentioned as cough as the denominator; [b]Percentages are calculated by taking the total number of elderly patients with cough complaints as the denominator; CPs, consultant physicians; EMR, electronic medical record; ENT, ear, nose and throat; GPs, general physicians; *n*, number of patients



Figs 4A and B: Associated conditions in elderly patients with (A) productive cough and (B) nonproductive cough (COPD, chronic obstructive pulmonary disease; ENT, ear, nose and throat; RTI, respiratory tract infection; T2DM, type 2 diabetes mellitus)

hypertension and bronchitis, while the patients of CPs had hypertension and T2DM as the other frequent conditions. The patients visiting pulmonologists reported asthma and bronchitis. Those consulted by ENT specialists were seen with gastroenteritis and bronchitis as the common conditions next to RTI (Fig. 3B).

Conditions Associated with Acute Cough in Elderly Patients (Productive and Nonproductive Cough)

Respiratory tract infection was the frequently reported associated condition among the patients consulting the GPs and ENT specialists, whereas the patients of the CPs and pulmonologists presented with hypertension alongside cough. The major associated conditions of the elderly patients in both the productive and nonproductive cough were RTI, hypertension, COPD, T2DM, and asthma (Figs 4A and B).

Common Complaints in Adult Patients with Acute Cough

Productive Cough

Among the patients treated by GPs and CPs, fever and cold were the major complaints, while in the patients who consulted pulmonologists, fever and shortness of breath were the top complaints. Throat pain and cold were reported by the patients of ENT specialists. Specific complaints such as shortness of breath, wheezing, throat pain, and breathlessness were observed at key treating specialties, including pulmonologists and ENT specialists, apart from the common complaints of fever and cold (Fig. 5A).

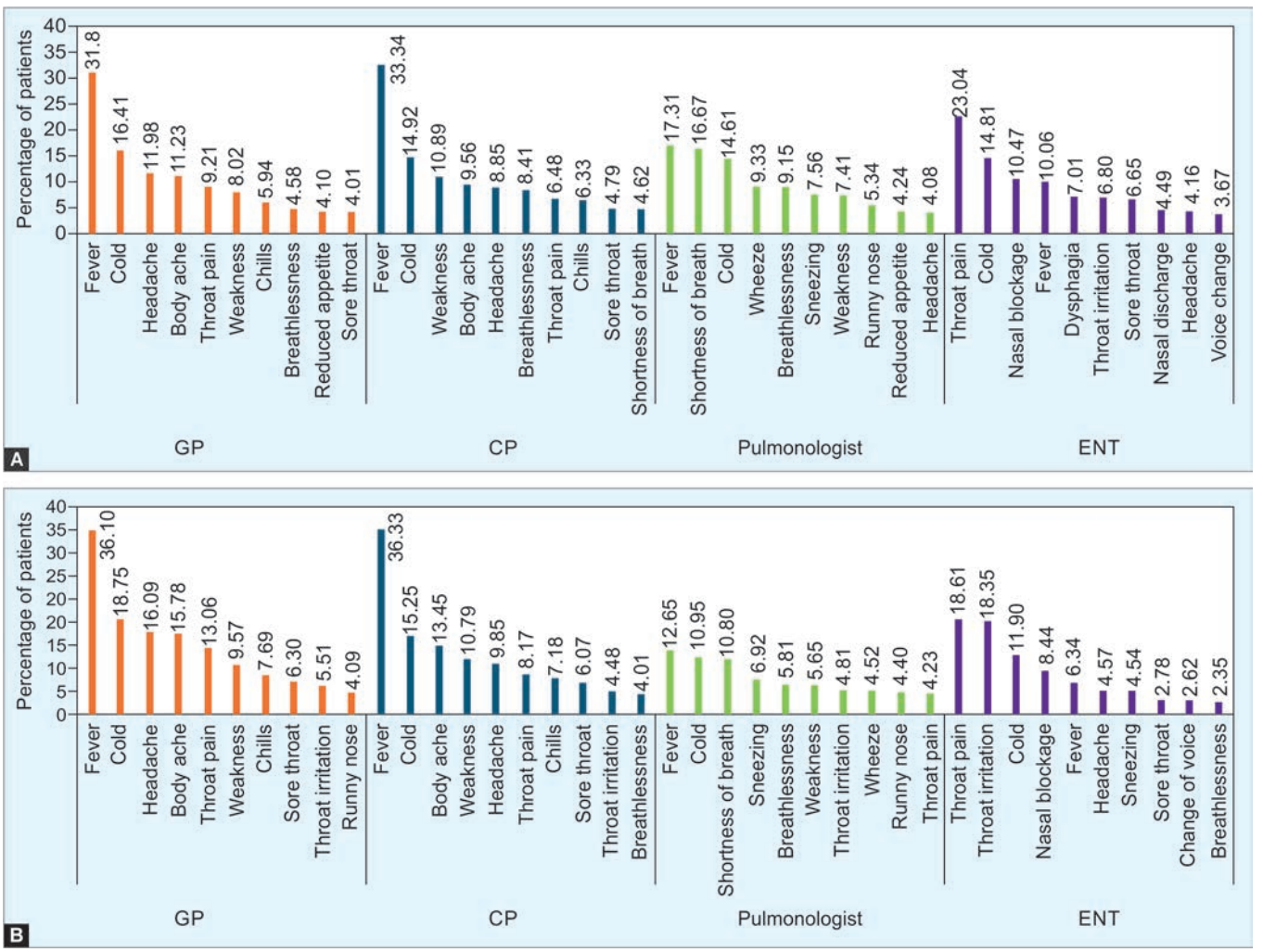
Nonproductive Cough

Fever, cold, headache, body ache, weakness, and throat pain were the top complaints in the patients of GPs and CPs, whereas those who visited specific specialties, including pulmonologists and ENT specialists, presented with shortness of breath, wheezing, sneezing, nasal blockage, etc., apart from common complaints of fever and cold (Fig. 5B).

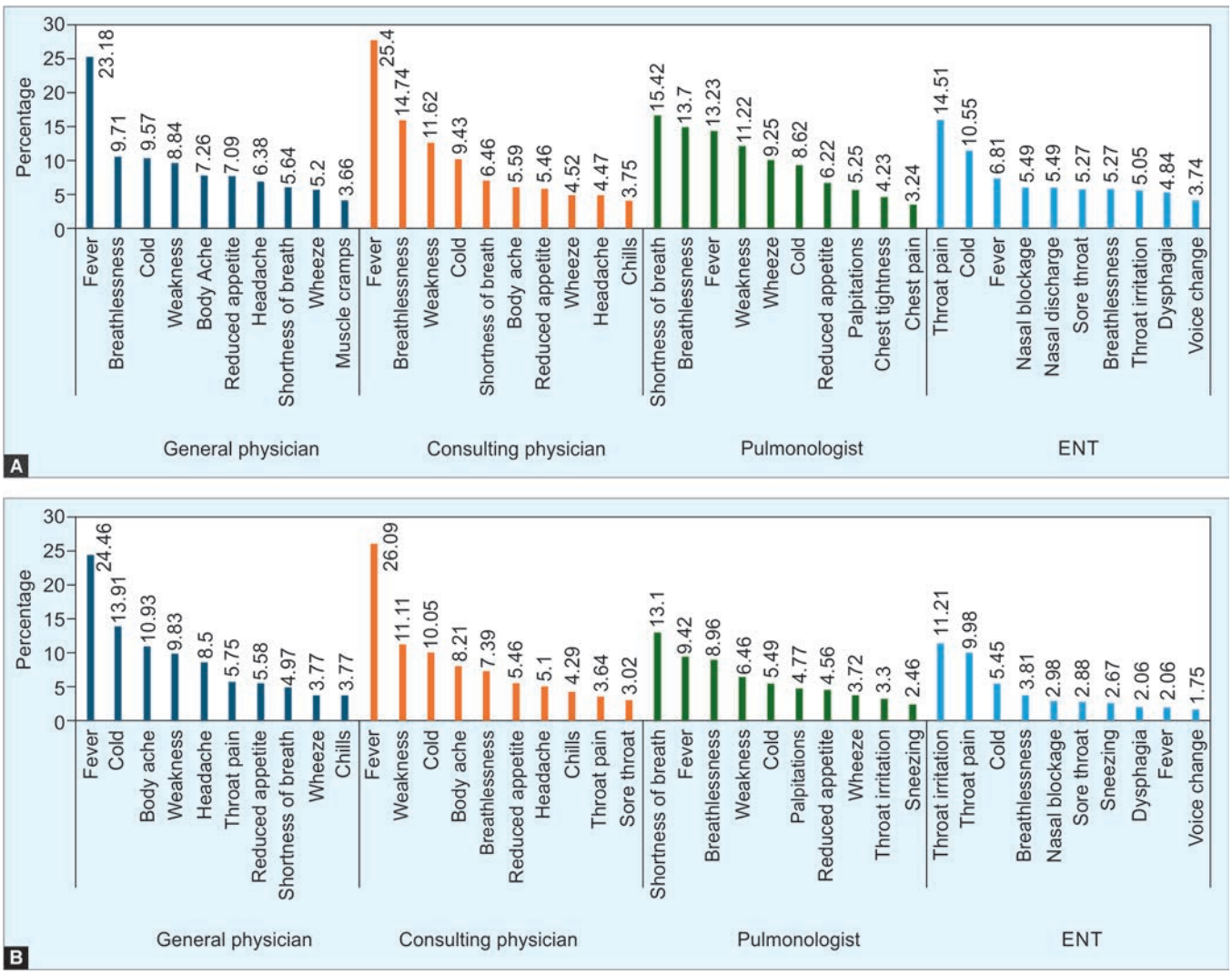
Common Complaints in Elderly Patients with Acute Cough (Productive and Nonproductive Cough)

Fever and breathlessness were the major complaints among the elderly patients with productive cough consulted by the GPs and CPs, followed by cold and weakness. Those visiting the pulmonologists frequently reported shortness of breath. Fever, weakness, wheeze, and cold were the other complaints reported. Throat pain and cold were found to be high in patients of ENT specialists along with fever, nasal blockage, nasal discharge, and sore throat (Fig. 6A).

Among the elderly patients with nonproductive cough, fever was reported frequently by patients of GPs and CPs. Shortness of breath and throat irritation



Figs 5A and B: Top 10 complaints in adult patients with (A) productive cough and (B) nonproductive cough (CP, consultant physician; ENT, ear, nose and throat; GP, general physician)



Figs 6A and B: Complaints in elderly patients with (A) productive cough and (B) nonproductive cough (ENT, ear, nose and throat)

were found at higher proportions in patients consulting pulmonologists and ENT specialists (Fig. 6B).

Discussion

Acute cough is self-limiting, and it is one of the most common reasons that patients seek medical attention.[16] In primary care practice, there is a scope to improve the evaluation and management of acute cough for better patient outcomes.

The present study data showed that the majority of the cough patients are not getting categorized. Although categorization of cough in the current practice by duration (acute, subacute, or chronic) appears to be straightforward, it is complex and imprecise. As all cough begins as acute, it becomes challenging to predict their progression. An acute cough is further subcategorized as a dry cough which indicates a noninfectious cough, and a wet cough is commonly seen in infectious conditions (sputum volume > 10 mL/day). Apart from this, certain underdiagnosed chronic conditions such as asthma may be overlooked in uncategorized scenarios, leading to recurrent symptoms and protracted suffering. The variability in cough definitions and overlapping symptoms often leads to coughs being categorized as unspecified by the healthcare professionals (HCPs), regardless of their specialties. The classification of a cough as unspecified highlights the complexity of its characteristics and the underlying pathologies.[12,17] This emphasizes the need for primary care physicians and specialists to understand cough categorization and recognize the importance of recording patient history for accurate diagnosis. A recent report by the Association of Physicians in India (API) has also recommended the adherence to simplified clinical practice recommendations and assessment tools to facilitate cough categorization and optimize cough management.[18] Thus, adopting an evidence-based approach that includes a comprehensive medical and family history, and an assessment of cough characteristics and sputum can provide HCPs with critical diagnostic insights and facilitate targeted therapy.

In our current study, the number of adult patients with cough complaints was 14,42,452 patients (64.06%) and the elderly patients were 2,33,999 patients (10.39%), indicating a higher cough prevalence among the adult patients. The analysis of the cough categorization revealed a higher prevalence of nonproductive cough. This aligns with the findings of Narayanan et al., who also reported a high occurrence of dry cough.[19] Additionally, almost three-fourths of adult patients (71.04%) had unspecified cough with no mention of the cough type. On the contrary, our results demonstrated that productive cough showed a higher occurrence (18.78%) than the nonproductive cough (14.80%) among the elderly patients. This might be attributed

to age-related changes in the respiratory system, including decreased ciliary function and increased susceptibility to infections.[20] Similar to the adult population, unspecified cough was also reported in almost two thirds of elderly patients (66.42%). The higher occurrence of unspecified cough indicates the lack of proper categorization of acute cough across the specialties. This further contributes to irrational prescriptions of fixed-dose combinations (FDCs) and antibiotics for the management of acute cough.

The behavior of the HCPs varies significantly due to differences in training, patient population, and clinical focus. The distinct clinical focus of each specialty shapes the practice behaviors and approaches of HCPs within their respective fields.[21] GPs have increasingly utilized electronic health records and telehealth services, particularly during the COVID-19 pandemic, with a strong emphasis on preventive care.[22] In the instance of cough, people tend to visit the GPs as they fulfill a crucial role in healthcare. Drawing from patient history and examination, GPs engage in triaging both self-limiting symptoms and severe, potentially life-threatening conditions.[15] Similarly, our study observed that patients more often consulted CPs and GPs than other specialties for their cough-related concerns.

Studies in primary care show that RTI is the most frequent underlying condition in acute cough.[23,24] In this context, our observations reveal RTI as the predominant condition associated with cough complaints, alongside asthma, bronchitis, hypertension, allergy, etc. Many medications can cause drug-induced cough; however, the causality of cough due to ongoing treatment for comorbid conditions was not evaluated in this study. Furthermore, research has consistently highlighted fever and cough as common symptoms in patients with acute respiratory conditions, as demonstrated by their prevalence in cases of acute cough.[25,26] In line with this, in the current study, adult patients with acute cough commonly presented with fever and cold across all the specified doctor specialties, with other common complaints, including shortness of breath, headache, and throat irritation. The number of adult patients with acute cough accompanied by fever was 10,66,402 (74%), and that of the elderly patients was 1,13,924 (49%). These observations indicate the importance of prompt recognition and management of various associated conditions and complaints in clinical practice for effective patient care.

Although this was a comprehensive retrospective study, it had certain limitations such as missing data points, which are common for retrospective analysis. Moreover, the data were available only for the HCPs who opted for EMR and were mostly from the urban/tertiary care settings. Other limitations included increased data over the years due to the addition of a greater number of HCPs to the EMR platform. The duration of the cough was also not analyzed in the study.

Conclusion

Identifying and managing cough is complicated by various factors, and misconceptions about its severity, causes, and categorization are common due to a lack of standardized scientific assessment. The current real-world evidence (RWE) study provides valuable insights into the prevalence of acute cough and highlights the significant challenges in the categorization and management of acute cough among Indian adult and elderly patients. The substantial prevalence of unspecified cough highlights the potential gaps in clinical practice, often exacerbated by variability in the training, clinical focus, and practice behaviors of HCPs across different specialties. This may contribute to inconsistent diagnoses and the potential for irrational prescribing practices, such as the overuse of FDCs and antibiotics. To address these challenges, educating primary care physicians and specialists on accurate cough classification will add value and impact patient outcomes. More evidence to substantiate the above-mentioned challenges for acute cough categorization may help us to educate primary care physicians on the correct evaluation and management of acute cough.

The study also reveals that patients frequently present with overlapping symptoms, such as fever, shortness of breath, and throat irritation, which further complicate the diagnostic process. This reinforces the importance of prompt and accurate recognition of cough-related conditions across all medical specialties.

The analysis of the prevalence, categorization, and clinical characteristics of acute cough in this study emphasizes the importance of refining cough categorization to optimize healthcare resources and interventions, ultimately reducing the burden and impact of cough across different populations.

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Disclosures

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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.

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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 listed as authors. All authors had access to the study data and made the final decision regarding where to publish these data and approved submission to this journal.

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