

# Physician-Diagnosed Chronic Obstructive Pulmonary Disease Prevalence According to Age Groups in Türkiye

## *Türkiye’de Yaş Gruplarına Göre Doktor Tanılı Kronik Obstruktif Akciğer Hastalığı Prevalansı*

**İD Tarkan Özdemir<sup>1</sup>, İD Çiğdem Özdekan<sup>2</sup>, İD Mustafa Hamidullah Türkkani<sup>3</sup>, İD Nilgün Yılmaz Demirci<sup>4</sup>, İD Hatice Kılıç<sup>5</sup>, İD Orhan Koç<sup>6</sup>, İD Can Öztürk<sup>4</sup>**

<sup>1</sup>Department of Chest Diseases, University of Health Sciences, Ankara Sanatoryum Training and Research Hospital, Ankara, Türkiye

<sup>2</sup>Department of Chest Diseases, University of Health Sciences, Dr. Abdurrahman Yurtaslan Oncology Training and Research Hospital, Ankara, Türkiye

<sup>3</sup>Department of Chest Diseases, Etimesgut State Hospital, Ankara, Türkiye

<sup>4</sup>Department of Chest Diseases, Gazi University Faculty of Medicine, Ankara, Türkiye

<sup>5</sup>Department of Chest Diseases, Ankara City Training and Research Hospital, Ankara, Türkiye

<sup>6</sup>Department of Administration, Ministry of Family and Social Policies, Ankara, Türkiye

### Abstract

**Introduction:** Chronic obstructive pulmonary disease (COPD) is one of the most important morbidity and mortality reasons worldwide. The purpose of our study is to evaluate physician-diagnosed COPD epidemiology according to age groups.

**Methods:** ICD10 J44.0-9 diagnoses codes in the database of Turkish Social Security Institution between 2007 and 2016 was checked through. Distribution of COPD through age groups (40–49, 50–59, 60–69, 70–79, and 80 years and older) among male and female population still alive in 2016 was calculated.

**Results:** 56.7% of 3,168,459 patients with average age of 62.53±15.07 were males. It was determined that 3.2% prevalence in female age group of 40–49 increased up to 23.1% in the age of 80+, 4.2% prevalence in male age group of 40–49 increased up to 35.3% in the age of 80+. In total, it increased from 3.7% to 27.7% in the same group of ages. Rate of the patients between the ages of 40–69 was calculated as 66% of the total number of patients.

**Discussion and Conclusion:** As a result, physician-diagnosed COPD prevalence in Türkiye has an increasing trend by age both in male and female population. One out of each four individuals over the age of 80 years is diagnosed with COPD. Such an evaluation shows that COPD is more frequently in older ages. However, it is not correct to limit COPD as an advanced age disease, since the majority of the patient population is 70 years and under.

**Keywords:** Age groups; COPD; Epidemiology; Prevalence

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**Correspondence:** Tarkan Özdemir, M.D. Sağlık Bilimleri Üniversitesi, Ankara Sanatoryum Eğitim ve Araştırma Hastanesi, Göğüs Hastalıkları Kliniği, Ankara, Türkiye  
**E-mail:** tarkan.ozdemir@saglik.gov.tr **Submitted:** 02.10.2022 **Revised:** 22.05.2023 **Accepted:** 08.09.2023

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Chronic obstructive pulmonary disease (COPD) is a chronic respiratory disorder which significantly affects clinical, epidemiological, and socioeconomic status of patients. Smoking, occupational exposure to dust particles, pollution, smoke (from biomass fuel, traffic, and industry), urbanization, and a worldwide aging of the population are the key risk factors for initiation of disease.<sup>[1]</sup> Respiratory diseases in general receive little attention and funding in comparison with other major causes of global morbidity and mortality. In particular, COPD has been a major public health problem and will remain a challenge for clinicians within the 21<sup>st</sup> century. COPD, worldwide, is in the spotlight and morbidity and mortality create formidable challenges for health-care systems<sup>[2]</sup> since its high prevalence. Numerous studies have been performed related with COPD prevalence. Prevalence is still variable due to multifactorial reasons.<sup>[3]</sup> According to the study which has been conducted in 2010 based on the global load of COPD worldwide, there were 168 million male and 160 million female having COPD which was total 328 million people worldwide.<sup>[4]</sup> A study conducted by BOLD initiative showed that percentage of the patients vary from 11.4% in China to 26.1% in Austria. Adana province has been included in the study from Türkiye and Stage 2 and above prevalence determined as 6% among females as 15.4% among males.<sup>[5]</sup> Data of the age group of  $\geq 25$  gathered from national system including the years between 1999 and 2011 were analyzed. In 2011, it was reported that 6.5% of adults (approximately 13.7 million) were diagnosed with COPD.<sup>[6]</sup> The prevalence range in Europe is varying from 3.5 to 17.4% where Denmark is having the highest percentage which is 17.4%.<sup>[7]</sup>

A fixed ratio of the forced expiratory volume in 1 second/forced vital capacity (FEV1) equal to 0.7 may overestimate the prevalence of obstruction. This is also another important problem in the elderly population.<sup>[8]</sup> Even if it was not well defined whether healthful aging causes COPD or age was reflecting cumulative effect of all the parameters those were exposed to, it was definite that age was a risk factor for COPD.<sup>[9,10]</sup> However, it should not signify that COPD is a disease for elders even if COPD prevalence increase by age. In fact, the disease starts showing its initial signs starting from the age of early 40s, but it cannot be early diagnosed. According to the study performed by Vandevoorde et al.,<sup>[11]</sup> a number of the patients in the age group of 40–49 and 50–59 years those applied to the family physician having a story of smoking background with 15 p/year, and having not been diagnosed with COPD be-

fore are more compared to the age group of 60–70 years. The prevalence of COPD is increasing continuously due to increase in smoking and industrialization. Preventing measurements at the acute stage of COPD can dramatically reduce the management cost.<sup>[12]</sup>

The purpose of our study is to evaluate physician-diagnosed COPD epidemiology through age groups. We believe that our study shall have COPD load well understood and be a guide to future studies.

## Materials and Methods

### Study Design and Subjects

Our study was designed as retrospective and descriptive. Data of Turkish Social Security Institution (TSSI) covering 98.6% of the population of Türkiye and financing health insurance connected to the state was used in our study. The study was planned in accordance with the Declaration of Helsinki. Individuals over the age of 40 years were diagnosed with J44, J44.0, J44.1, J44.8, and J44.9 according to ICD 10 coding, applied to the health organizations between 2007 and 2016 and still alive by 2016 were included in our study. Calculations were made on the number of individuals, not the number of applications. Citizenship numbers were used to deduplicate patient applications. Age groups were defined as 40–49, 50–59, 60–69, 70–79, and 80+. Number of the patients were evaluated together with the same population in Türkiye in the same age group.<sup>[13]</sup> All data were collected by the data miner, who is the staff of the institution. No patient's identity information was shared with us. TSSI staff worked on the raw data in the database of TSSI. Structured Query Language querying was executed using Tool for Oracle Application Developers program. Age groups were defined and querying executed separately for each age group. Querying repeated for 3 times to verify the correction of the data.

### Ethics Committee Approval

This study was approved by the Ethics Committee of Ankara Oncology Training and Research Hospital (Date: November 14, 2018, Approval Number: 2018-11/136). Data of the patients were treated according to the Declaration of Helsinki Guidelines.

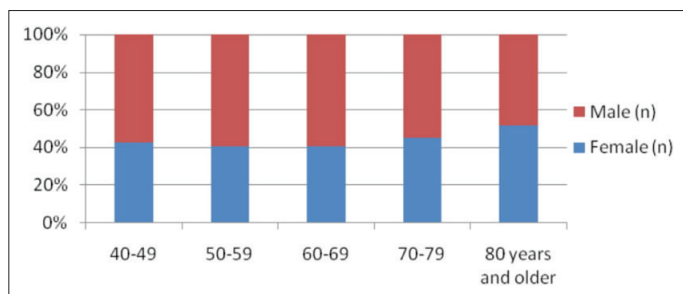
### Statistical Analysis

Collated data were by processed using the SAS Enterprise Guide 5.1 statistical program (SAS Institute Inc. Cary, North Carolina).

**Table 1.** Demographic data of physician-diagnosed COPD patients

Age group	Female		Male		Total	
	n	%	n	%	n	%
40–49	166.290	12.1	221.428	12.3	387.718	12.2
50–59	310.435	22.6	450.605	25.1	761.040	24.0
60–69	382.882	27.9	560.563	31.2	943.445	29.8
70–79	318.211	23.2	382.318	21.3	700.529	22.1
80 years and old	195.149	14.2	180.578	10.1	375.727	11.9
Total	1.372.967	100	1.795.492	100	3.168.459	100

COPD: Chronic obstructive pulmonary disease.



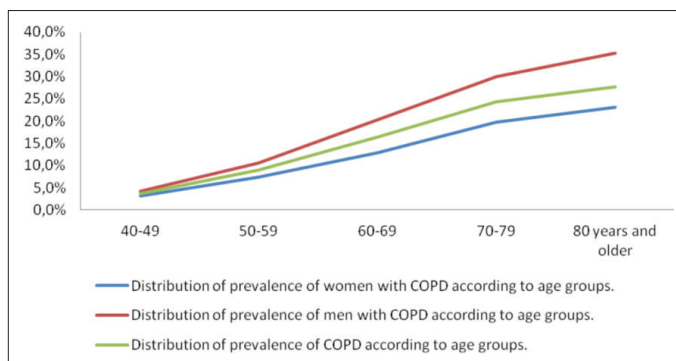
**Figure 1.** Rate of gender distribution of physician-diagnosed COPD patients in Türkiye according to age groups.

## Results

43.3% of 3,168,459 patients with average age of 62.53±15.07 were females and 56.7% were males. The age group which COPD was less observed was found 40–49 with 12.1% (n=166.290) among females, 12.3% (n=221.428) among males and 12.2% (n=387.718) in total. Furthermore, the age group which was the most frequently observed was found 60–69 with 27.9% (n=382.882) among females, 31.2% (560.563) among males, and 29.8% (943.445) in total. 69% of the patients were at the age of 69 and below (Table 1).

When numerical distribution of gender was evaluated, it was determined that the number of the males were more in every age group up to the age group of 80 and females were numerically more after the age of 80 years (Fig. 1).

When the prevalence of COPD standardized to the age groups was evaluated among females, the prevalence was 3.2%, 7.3%, 12.8%, 19.8%, and 23.1% in the same order of the age groups of 40–49, 50–59, 60–69, 70–79y, and 80 years and older, respectively. When the prevalence of COPD standardized to the age groups is evaluated among males, the prevalence was 2%, 10.6%, 20.2%, 30.0%, and 35.3% in the same order of the age groups of 40–49, 50–59, 60–69, 70–79, and 80 years and older, respectively. It was defined as 3.7%, 9.0%, 16.4%, 24.3%, and 27.7% as sum of males and females in the same group of ages (Fig. 2).



**Figure 2.** Distribution of the prevalence of physician-diagnosed COPD patients in Türkiye according to the age groups.

## Discussion

Our study can be considered quite important since it is covering almost entire population of Türkiye and is the sole study conducted within this subject. Our study results indicated that the number of COPD- diagnosed patients in the age group of 60–69 is 29.8% and COPD prevalence over the age of 80 is higher than 27.7%. Furthermore, the number of the patients between the ages of 40–70 years was found as the 66% of the total patients even though the number of male patients before the age of 80 years was more than females, number of female patients after the age of 80 years was more than males. According to our results, the prevalence of male and females diagnosed as COPD is increasing by age.

It was seen in a study conducted in Spain evaluating all similar age groups with our study but focused on the age of 80+, COPD prevalence increased by age (3.8% in 40–49 years; 7% in 50–59 years, 14.5% in 60–69 years, and 22.8% in 70–80 years) and the prevalence of males was higher in all the age groups.<sup>[14]</sup> In a study of BOLD covering 12 countries, Stage 2 or higher female prevalence varied between 1.3–7.8%, 1.3–19.8%, 4.4–23.4%, and 6.2–32.7% in the same order with the age groups of 40–49, 50–59, 60–69, 70+. Stage 2 and higher male prevalence in the same age groups

was between 0–17.5%, 3.3–20.8%, 8.9–39.4%, and 18.9–40.4% in the same order with the same age groups.<sup>[5]</sup> In a meta-analyses conducted in China, it was determined that COPD prevalence in the age group of 40–49 was 3.2% and differed to 20.3% in the age group of 70.<sup>[15]</sup> In an another study conducted using Canadian National data, 3.2% COPD prevalence in a male and female population increased by age.<sup>[16]</sup> The mutual outcome of the studies was that, COPD prevalence increased by age. However, in a study conducted in Uganda, COPD prevalence in the age group of 30–39 years was higher (39%) and interestingly decreases in the age groups of 40–49, 50–59, 60–69, 70–79 and 80+.<sup>[17]</sup> In our study, the prevalence of COPD increased by age was similar with the literature. 3.2% prevalence in the female age group of 40–49 increased to 23.1% in the age group of 80+, 4.2% prevalence in the male age group of 40–49 increased to 35.3% in the age group of 80+. In total, it increased from 3.7% to 27.7% in the same group of ages.

In our study, the age group of 60–69 had the highest number of patients who were involved (28.8%) and the rate of the number of patients below the age 70 years to the whole study population was 66%. In a surveillance study conducted in the USA depending on national data, the ratio of the COPD-diagnosed patients below the age of 65 to the total number of patients was 67.6% (8,043,000/11,899,000). The age interval in which most of the patients accumulated was 55–64 (25.7%).<sup>[18]</sup> In a meta-analyses which 67 studies were viewed with the aim of revealing global load of COPD, the ratio of the patients in the age group of 40–64 years was 56.6%.<sup>[19]</sup>

Our study findings also revealed the potential burden of COPD on the global health-care system. In a study conducted by Özdemir et al.<sup>[20]</sup> and examining the epidemiology of physician-diagnosed COPD in Türkiye in 2016, the prevalence found in men was 6.7%, while it was 5.1% in women. When compared to the data of 2011 without gender discrimination, an increase of 35% was detected. In a previous study of Türkkan et al.,<sup>[21]</sup> which analyzed morbidity rates, it was determined that the annual average number of hospital admissions per patient in COPD was 2.09, 20% of hospital admissions were to the emergency department, the hospitalization rate was 17.75%, and the average hospital stay was 6.5 days. In another study conducted by Özdemir et al.,<sup>[22]</sup> hospital costs related to COPD were examined and the cost of outpatient clinic examination per patient was found as 14 dollars, the emergency examination fee was 23 dollars, and the inpatient service fee was 637 dollars. In the COPET study which focused on phenotype distribution, the rate of patients in the non-exacerbator (NON-AE), frequent exacerbator without chronic bronchitis (AE NON-

CB), frequent exacerbator with chronic bronchitis (AE-CB), and asthma/COPD overlap (ACO) groups was 55.7%, 25.6%, 13.9%, and 4.8% were found, respectively. The symptom scores, ADO (age, dyspnea, and FEV1) index, and the rates of exacerbation were significantly higher in the AE-CB and AE NON-CB phenotypes than in the ACO and NON-AE phenotypes.<sup>[23]</sup> In the ALPHABET study, which was also performed in the Turkish population in 2015, the rate of patients evaluated in the GOLD A group was 41.1%, and the rate of patients evaluated in the GOLD C group was 13.2%.<sup>[24]</sup>

The most important limitation of our study was that, information supporting the diagnose of COPD patients; such as symptomatic evaluations and pulmonary function tests were not available in the database of TSSI. Thus, definite diagnose of COPD was taken into consideration if accurate diagnose was recorded by the physicians, otherwise kept out of evaluation if it was recorded as pre-diagnose to minimize false diagnostic data.

## Conclusion

As a result, physician-diagnosed COPD prevalence in Türkiye has an increasing trend by age both in male and female population. One out of each four individuals over the age of 80 is diagnosed with COPD. Such an evaluation shows that COPD is more frequently in older ages. However, it is not correct to limit COPD as an advanced age disease, since the majority of the patient population is 70 years and under.

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**Ethics Committee Approval:** The Ankara Oncology Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 14.11.2018, number: 2018-11/136).

**Authorship Contributions:** Concept: TÖ, OK, MHT; Design: TÖ, OK, MHT, CÖ; Supervision: CÖ, ÇÖ, NYD, HK; Fundings: TÖ; Materials: TÖ, MHT; Data Collection or Processing: TÖ, OK; Analysis or Interpretation: TÖ, NYD, HK, CÖ; Literature Search: TÖ, NYD, ÇÖ, CÖ; Writing: TO, ÇÖ; Critical Review: TO, CÖ, ÇÖ.

**Conflict of Interest:** None declared.

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