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Awareness of Obstructive Lung Diseases and its Risk Factors, A Systematic Review

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is characterized by tissue loss and a growing restriction of airflow. Due to chronic inflammation brought on by extended exposure to noxious particles or gases, most often cigarette smoke, it is linked to structural abnormalities in the lungs. Airway constriction and a reduction in lung recoil are the results of chronic inflammation. In affluent countries, the majority of COPD cases are caused by tobacco use. Smoking duration and pack years determine the severity of the condition, which causes alveolar damage and gradual loss of lung function. COPD is mostly brought on by environmental contaminants in poorer nations. The study aims to summarize current pieces of evidence about Obstructive lung disease awareness among different populations in addition to its risk factors, causes, management, and prognosis. For article selection, the PubMed database and EBSCO Information Services were used. All relevant articles relevant to our topic and other articles were used in our review. Other articles that were not related to this field were excluded. The data was extracted in a specific format that was reviewed by the group members. Our study included 9 studies in total. The studies indicated that there is low awareness of the disease among many regions that different studies were made which means that there is an increased need for raising awareness of the disease and its risk factors such as smoking. Moreover, when it comes to the management of the disease one study indicated that patients who use single-administration inhalers are more compliant with the treatment than those who used multiple administrated ones.

Keywords: *Obstructive lung disease, COPD, Lungs, Respiratory disease, Respiration*

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INTRODUCTION

A prevalent and curable illness known as a chronic obstructive pulmonary disease (COPD) is characterized by tissue loss and a growing restriction of airflow. Due to chronic inflammation brought on by extended exposure to noxious particles or gases, most often cigarette smoke, it is linked to structural abnormalities in the lungs. Airway constriction and a reduction in lung recoil are the results of chronic inflammation. The illness frequently manifests as coughing, dyspnea, and sputum production. Asymptomatic conditions to respiratory failure are all possible symptoms (Agarwal *et al*., 2022).

The substantial pathophysiology of COPD is irreversible airway obstruction with progressive lung function decline, particularly in those who have ongoing exposure to risk factors like cigarette smoke, biomass smoke exposure, and air pollution. Although the lung-function trajectories of some patients have a milder course. In order to prevent the progression of pre-COPD (pre-COPD) to overt COPD, the decline in lung function in people who do not meet the diagnostic criteria for COPD must be prevented.Furthermore, early diagnosis of preclinical COPD may be beneficial to prevent clinically significant deterioration, such as a reduction in lung function, the emergence of symptoms, or an acute exacerbation, in people with fixed obstruction on spirometry who have no or very mild symptoms (Woodruff *et al*., 2016; Petersen *et al*., 2018; Çolak

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et al., 2019; Choi & Rhee, 2020; Grant *et al*., 2020; Guerra & Martinez, 2020; Li *et al*., 2020; Wijnant *et al*., 2020).

In affluent countries, the majority of COPD cases are caused by tobacco use. Smoking duration and pack years determine the severity of the condition, which causes alveolar damage and gradual loss of lung function. COPD is mostly brought on by environmental contaminants in poorer nations. In nations with low and moderate incomes, about 90% of deaths from COPD among people under 70 occur (LMIC). The usage of biomass fuel to create electricity is the cause of the increased mortality in LMIC. The most popular biomass fuels are specifically firewood and crop waste from agriculture. Because biomass fuel is burned, harmful emissions in the form of particulate matter, which includes carbon monoxide and formaldehyde are released into the atmosphere (Pahal *et al*., 2022).

Prolonged exposure to hazardous chemicals or particles results in COPD. The most frequent cause of COPD globally is cigarette smoking. Other factors may include exposure to secondhand smoke, the environment, occupational hazards, and a lack of alpha-1 antitrypsin (AATD) Smokers and those over 40 are more likely to have COPD. It is presently the third most prevalent cause of illness and mortality globally, and its prevalence rises with age. Around 3.2 million people globally died from COPD in 2015, and there were 174 million people worldwide with COPD. Due to the underdiagnosis of COPD, the prevalence is most likely to be underestimated (Agarwal *et al*., 2022).

The family doctor prescribes spirometry to make a diagnosis and establish the severity of the condition based on the symptoms and smoking history. Common causes of deteriorating COPD and COPD exacerbation include comorbidities and infections. As a result, ensuring that COPD and its comorbidities are adequately monitored and managed is equally important for enhancing patient survival. The respiratory unit intensive care unit (ICU) treats patients with serious disorders who go through exacerbations. Patients with COPD exacerbations who also have renal illness should get care in the intensive care unit (ICU), where a variety of specialty doctors may attend to them. Following discharge, the patient's ongoing care is guaranteed thanks to the hospital and family doctor's cooperation (Pahal *et al*., 2022).

Study objective

The study aims to summarize current pieces of evidence regarding awareness of obstructive pulmonary disease as a risk factor and its effect on patients' prognosis.

MATERIALS AND METHODS

Study design

In order to develop a consistent empirical research programme that builds on prior knowledge, a systematic assessment of the current evidence on obstructive pulmonary disease is regarded as a reliable method of locating and synthesising the peer-reviewed papers for evidence in this field. Only an interpretation could be made from the qualitative material in this review. A qualitative data synthesis also strives to produce conclusions that are meaningful, pertinent, and appropriate for individuals, to guide a research agenda, and ultimately to improve behaviours about obstructive pulmonary disease. The review combined, integrated, and, where appropriate, interpreted the data from the included studies using qualitative synthesis approaches.

The review attempts to go beyond the simple collection of data to offer further interpretive insights into obstructive pulmonary disease and to identify areas where more research can expand on what is already known.

Study eligibility criteria

Peer-reviewed qualitative research were included in the review. Mixed-methods studies' qualitative data was assessed for applicability before being added if it passed muster.The study included those studies that have been conducted in twenty years. All peer-reviewed articles published in English, reporting awareness of obstructive pulmonary disease were included.

For the studies to be included for the review, papers were all published between January 2012 and August 2022. This would guarantee the work's currency and allow for the identification of developing issues from a wide range of perspectives

Study inclusion and exclusion criteria

The papers were chosen for the process focusing on their applicability, English, and consideration of a ten-year time limit. All additional articles, repeated studies, reviews of research, and articles with a primary purpose other than one of these areas were disregarded. The reviewers disqualified any studies that were not published in English, as well as any books, grey literature, or editorial comments. Additionally omitted were studies that solely provided qualitative data.

Selection of study

The selection procedures and outcomes were presented using the ENTREQ criteria for presenting qualitative systematic reviews. To help with duplication removal, all retrieved studies were initially imported into the Endnote library. After eliminating the duplicates, the two reviewers used a shared Endnote library to individually browse the papers by title and abstract while being led by the qualifying requirements. A full-text review of the studies that the two reviewers had selected was conducted.

Any disagreements between the two reviewers were resolved by a third reviewer. The whole texts of all qualifying studies were examined by the two reviewers independently. When the opinions of the two reviewers differ, an agreement was sought by talking about the issues with the third reviewer. For the final framework synthesis, the complete texts of all pertinent research that met the inclusion criteria were kept.

Data extraction

Two reviewers separately gathered data from qualifying studies onto a customised data extraction form, filling it with information about the research population and relevant occurrences. The third review author double-checked and double-verified the extracted articles. The initial author's name, the publication year, the duration of the data collection, and the geographical area of the study were all collected as study characteristics. Study-specific information was recorded, including the study's design, demographic, sample size, sampling techniques, and data collection methods.

Data synthesis and analysis

Data analysis was done without the use of any software. The data was organised by theme by the reviewers, who then provided the themes as an analysis Table (chart). The research were represented in the table's columns and rows, and related topics allowed us to compare the results of the studies across various themes and subthemes.

RESULTS AND DISCUSSION

The selection and identification of research are shown in **Figure 1**. A total of 314 studies were found after searching the aforementioned databases, which were then used for title screening. 67 of them were excluded after 213 of them were included for abstract screening. The whole texts of the remaining 146 publications were examined. Due to variations in research objectives, the full-text revision resulted in the elimination of 137 studies, and 9 were enlisted for final extracting data **(Table 1)**.

According to Baiardini I, *et al*, a low degree of illness knowledge (70%) was found in the recruited patient sample, particularly in terms of acceptance and assessment of the condition. The effect of symptoms on everyday life was adversely correlated with illness acceptance, awareness of the need for treatment, and general awareness, but disease knowledge was favorably correlated with COPD severity (Baiardini *et al*., 2018).

In Thakrar, *et al*. Study 300 individuals were enrolled, and 282 of them were used in the study. There were 105 women and 177 men in the subject group. 47.84% of people were aware of the "disease domain" whereas 25.14% were aware of the "pulmonary rehabilitation domain". 34.8% of people knew what causes COPD, 83.0% knew about typical symptoms, and 73.8% knew about daily activities that can make people feel more breathless. Only 26.2% of people said they needed to see a physiotherapist. Only 19.5% of the individuals were aware of procedures for secretion elimination, compared to 81.2% of the subjects who felt that breathing exercises may produce dyspnea (Thakrar *et al*., 2014). However, according to de Queiroz MC, *et al*. Only 9.2% of the 674 users interviewed knew what "COPD" was. 75.1% identified "emphysema" and 15.7%, did not identify any. Researchers discovered that knowing either phrase was linked to having more education (de Queiroz *et al*., 2014).

According to Pal, *et al*. a percentage of the cohort reported having no awareness of or no prior exposure to COPD, with 68% of Indigenous participants and 19% of non-Indigenous individuals expressing this. Nevertheless, only 18% of patients were found to be adhering to therapy. The most frequent symptom for hospital admission was shortness of breath (83%), and 69% of Indigenous patients said they sought treatment during an episode (Pal *et al*., 2022) In López-Pintor E and Grau J, Lumbreras B's Research. Patients with multidose DPI were less likely to be persistent than those with single-dose DPI; patients with knowledge of COPD were more likely to be persistent (López-Pintor *et al*., 2021).

In a survey conducted by Uzel, *et al*. 145 individuals (72%) correctly identified the organ most commonly impacted by COPD as the lung. Additionally, just 44 (22%) of the 152 patients who said they recognized where the damaged organ was situated on an image did. Only seven individuals (3.5% of the total) were able to write "chronic obstructive pulmonary disease" correctly (Uzel *et al*., 2017). Ghorpade, *et al*. questioned 5420 inhabitants in India. only 49 out of 5420 persons (0.9 percent of slum dwellers in cities and 1.1 percent of country inhabitants) had ever heard the term "COPD." When asked what the name of the condition brought on by long-term cigarette use was, 38% of those who had never heard the term COPD (n = 5371) responded with cancer, 16.7% with asthma, and 4.4% with tuberculosis. 6.1% of those who had heard of COPD (n = 49) believed it to be a heart illness, whereas 61% blamed COPD on smoke and dust pollution and 20% on tobacco use (Ghorpade *et al*., 2021) According to Hwang, *et al.* Just 24.8% were aware of COPD. 41.9% of participants said they were aware of pulmonary function testing, and 30.5% said they had done one. 47% of the participants who had never had pulmonary function tests before were unaware of their existence (Hwang *et al*., 2019). Ma, *et al*. study, was aimed at analyzing COPD knowledge among nurses. the average BCKQ score for all nurses was 35.76. The total score for respiratory nurses was substantially higher than for non-respiratory nurses (39.01 vs. 33.32, p 0.001). Between respiratory and non-respiratory nurses. According to a subgroup study of respiratory specialist wards, nurses working in the ward for chronic airway illness had the greatest overall knowledge scores (40.47). According to a linear regression study, the population of nurses, their educational background, and prior rotation in respiratory wards were all substantially correlated with the total BCKQ score (Ma *et al*., 2019).

The included studies had different study designs **(Figure 1)**.

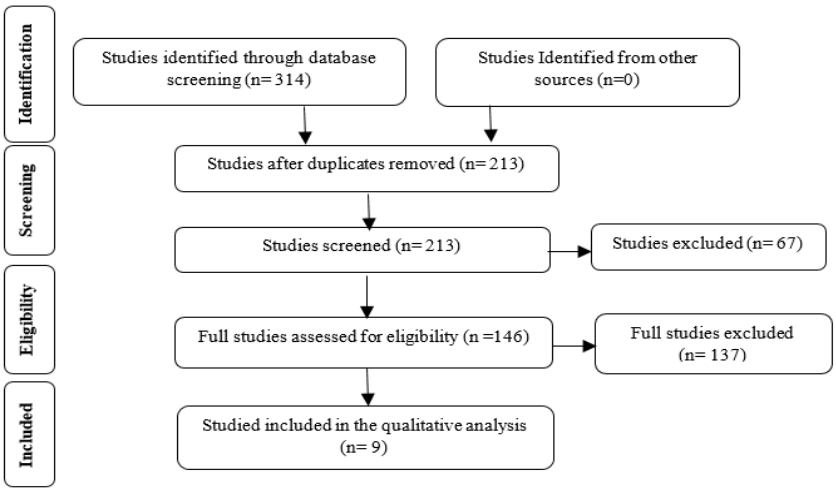

Figure 1. Flow chart represents the data expectation process of the included articles

Table 1. Author, country, year of publication, methodology, and outcome

Author, Publishing Year	Methodology	Results
Baiardini *et al.* (2018)	The DACQ was created in accordance with a list of criteria pertaining to the patient's understanding, acceptance, and perception of COPD as well as the necessity for therapy. Examining the questionnaire's internal organization and consistency, relationships with other patient-reported outcomes, and stability over time served to verify it. Furthermore, relationships between demographic and clinical characteristics and the degree of illness awareness among patients included in the SAT trial were analyzed using the DACQ.	A low degree of illness knowledge (70%) was found in the recruited patient sample, particularly in terms of acceptance and assessment of the condition. The effect of symptoms on everyday life was adversely correlated with illness acceptance, awareness of the need for treatment, and general awareness, but disease knowledge was favorably correlated with COPD severity.
Thakrar *et al.* (2014)	A cross-sectional study was conducted using "a COPD awareness questionnaire" to assess awareness. This was created and its material was verified. This questionnaire had a total of 21 questions. The two domains of these questions were pulmonary disease (1–12) and pulmonary rehabilitation (13-21).	47.84% of people were aware of the "disease domain" whereas 25.14% were aware of the "pulmonary rehabilitation domain". 34.8% of people knew what causes COPD, 83.0% knew about typical symptoms, and 73.8% knew about daily activities that can make people feel more breathless. Only 26.2% of people said they needed to see a physiotherapist. Only 19.5% of the individuals were aware of procedures for secretion elimination, compared to 81.2% of the subjects who felt that breathing exercises may produce dyspnea.
de Queiroz *et al.* (2014)	A questionnaire used in 674 interviews with PCC users to gauge their knowledge of COPD. The knowledge that smoking is a risk factor for COPD and that at least two of the condition's symptoms exist are considered sufficient information.	Only 9.2% of the 674 users interviewed knew what "COPD" was. 75.1% identified "emphysema" and 15.7%, did not identify any. Researchers discovered that knowing either phrase was linked to having more education. 16.2% of people reported having an acceptable understanding of COPD, and having this knowledge was linked to being older than 60. The majority of users (70.6%) were aware of dyspnea as a COPD symptom, and the majority (87.5%) were aware that smoking is a risk factor, but only a small percentage (4.9%) were aware that exposure to wood smoke is also a risk factor. The media (43.1%) and a family member with COPD (36.4%) were the two most commonly stated sources of information.

Pal *et al.* (2022)	Research to look into the understanding of COPD illness, one's awareness of it, and causes for hospital presentations among an Australian cohort made up primarily of Indigenous people. Out of a convenience sample of 100 persons overall, 86 patients agreed to take part in this 15-month trial. To determine the participant's degree of knowledge regarding COPD, drugs, self-management, healthcare interactions, and usages, a structured interview was done.	A percentage of the cohort reported having no awareness of or no prior exposure to COPD, with 68% of Indigenous participants and 19% of non-Indigenous individuals expressing this. Most patients were able to identify the drug they were using and self-reported using puffers or inhalers; nevertheless, only 18% of patients were found to be adhering to therapy. The most frequent symptom for hospital admission was shortness of breath (83%), and 69% of Indigenous patients said they sought treatment during an episode. The implementation of COPD action plans and self-management was unsatisfactory. A sizable majority (49%) reported having less than two hospital hospitalizations in the 12 months before.
Uzel *et al.* (2017)	Do COPD (chronic obstructive pulmonary disease) patients aware of their condition? The 201 consecutive ambulatory patients who attended the hospital's outpatient clinic were included in this cross-sectional, observational, single-center study. Gender, age, educational level, symptoms, smoking history, number of years since diagnosis, number of years since acquiring an exemption certificate, and COPD GOLD stage were all collected.	145 individuals (72%) correctly identified the organ most commonly impacted by COPD as the lung. Additionally, just 44 (22%) of the 152 patients who said they recognized where the damaged organ was situated on an image did. Only seven individuals (3.5% of the total) were able to write "chronic obstructive pulmonary disease" correctly.
Ghorpade *et al.* (2021)	to investigate the degree of COPD awareness in the urban slums of Pune, India, and the nearby rural areas. This cross-sectional community survey was open to all male and female participants over the age of 30 who lived in 13 randomly chosen slums in Pune city (with a total population of 3,000) and 7 randomly chosen nearby rural villages (also with a total population of 3,000). 13 certified community health workers (CHWs) completed a questionnaire to assess their knowledge of COPD after receiving signed informed permission.	0.9 percent of slum dwellers in cities and 1.1 percent of country inhabitants) had ever heard the term "COPD." When asked what the name of the condition brought on by long-term cigarette use was, 38% of those who had never heard the term COPD (n = 5371) responded with cancer, 16.7% with asthma, and 4.4% with tuberculosis. 6.1% of those who had heard of COPD (n = 49) believed it to be a heart illness, whereas 61% blamed COPD on smoke and dust pollution and 20% on tobacco use.
Hwang *et al.* (2019)	Field survey regarding COPD in Korea. Males over 40 who were presently smoking were contacted, and they self-administered a questionnaire. The questionnaire has six sections: (1) Baseline demographics, (2) Participants' knowledge of COPD and pulmonary function testing, (3) Participants' experience with pulmonary function testing, (4) Participants' optimistic bias toward COPD, (5) Participants' willingness to change their attitude toward respiratory health, and (6) Participants' preferred media for obtaining health-related information After completing the questionnaire, two qualified pulmonary function laboratory personnel evaluated pulmonary function using a portable spirometer.	Just 24.8% were aware of COPD. 41.9% of participants said they were aware of pulmonary function testing, and 30.5% said they had done one. 47% of the participants who had never had pulmonary function tests before were unaware of their existence. The participants' overall view that they were roughly as likely to acquire COPD as similarly aged smokers and friends, respectively, was reflected in the mean optimistic bias ratings, which were 3.9 and 4.0, respectively. 40.0% of participants thought they were less likely to develop COPD than their peers. In 28.6% of subjects, abnormal handheld spirometry values were seen. 36.7% of the individuals whose handheld spirometry findings were abnormal had FEV1 levels that were below 50% of the expected value.
Ma *et al.* (2019)	The knowledge of internal medicine nurses on COPD was examined in descriptive cross-sectional research with 175 participants at a sizable top-ranked tertiary hospital in China. The participants' knowledge of COPD was evaluated using the Bristol COPD Knowledge Questionnaire (BCKQ).	The average BCKQ score for all nurses was 35.76. Between respiratory and non-respiratory nurses, the mean scores for four categories were less than 3. According to a subgroup study of respiratory specialist wards, nurses working in the ward for chronic airway illness had the greatest overall knowledge scores (40.47). According to a linear regression study, the population of nurses, their educational background, and prior rotation in respiratory wards were all substantially correlated with the total BCKQ score.

The degree of COPD knowledge was below average among the patients who were recruited in the SAT trial and were referred to pulmonology facilities. Average levels of disease acceptance were relatively low, compared to greater levels of treatment requirements awareness and disease knowledge. The age or gender of patients did not affect COPD awareness. Patients who experienced more symptoms in their daily lives had lower disease awareness. Although acceptance and understanding of the need for therapy are crucial elements of awareness, patients with higher CAT scores also showed lower levels of both of these. They may have had less global awareness than patients with lower CAT scores, which might be the reason for it. As a result, the need for therapy increases as symptom severity increases and illness acceptance decreases. Given that

pharmacological therapies for COPD neither cure the condition nor offer instant relief, this element may be related to patients' concerns regarding treatment effectiveness (Baiardini *et al*., 2018).

It was discovered that a physiotherapist's function in the treatment of COPD was severely underappreciated (26.2%, below average). This may be due to several factors, including the general public's lack of knowledge regarding the function of physiotherapists in the treatment of pulmonary disorders and primary consultants' resistance to referring patients to a physiotherapist. Similar findings were obtained in research conducted in Bristol, UK, where it was shown that 54.7% of COPD patients were aware of the condition. People with or at risk for COPD have an inadequate understanding of the disease's etiology, clinical symptoms, diagnostic techniques, and treatments, according to French research (White *et al*., 2006; Carré *et al*., 2008; Pal *et al*., 2022).

Less than 5% of the respondents identified exposure to wood-burning stove smoke as a risk factor for COPD. Exposure to wood smoke is a significant risk factor in areas where the practice of cooking on wood-burning stoves is still prevalent. In Poland, 52% of the women with COPD diagnoses reported never smoking and using coal and wood for cooking. Through continuing education initiatives designed to lower the prevalence of COPD underdiagnosis in non-smokers, the knowledge that biomass burning is a risk factor must be adequately communicated to health professionals and the general public (Bednarek *et al*., 2008; Moreira *et al*., 2013; de Queiroz *et al*., 2014).

The importance of patient education and awareness in the overall care of COPD, including avoiding repeated hospital stays, has been established beyond a reasonable doubt. The results of this study show that techniques for providing knowledge and empowerment to COPD patients need to be improved and put into practice. Patients who are better informed about their condition are better able to self-manage their chronic disease, reducing PPH and thereby lessening the burden on the system's already overstretched health resources. This is in addition to enabling patients to manage their condition in a setting where they feel at ease and connected to family and land (Pal *et al*., 2022).

Varied persistence rates were linked to different device attributes. Different pharmaceutical formulations and inhaler devices are becoming more widely available, which are additional important elements in patients' compliance with their medical care. Given that up to 94% of patients made at least one mistake when using the inhaler device, more data are needed to help physicians prescribe the best medicine. Persistent patients were less likely to be on multidose DPI therapy (López-Pintor *et al*., 2021).

CONCLUSION

Our study included 9 studies in total. The studies indicated that there is low awareness of the disease among many regions that different studies were made which means that there is an increased need for raising awareness of the disease and its risk factors such as smoking. Moreover, when it comes to the management of the disease one study indicated that patients who use single-administration inhalers are more compliant with the treatment than those who used multiple administrated ones.

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REFERENCES

Agarwal, A. K., Raja, A., & Brown, B. D. (2022). Chronic Obstructive Pulmonary Disease. [Updated 2022 Jul 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559281/

Baiardini, I., Rogliani, P., Santus, P., Corsico, A. G., Contoli, M., Scichilone, N., Di Marco, F., Lessi, P., Scognamillo, C., Molinengo, G., et al. (2018). Disease awareness in patients with COPD: measurement and extent. *International Journal of Chronic Obstructive Pulmonary Disease*, *14*, 1-11. doi:10.2147/COPD.S179784

Bednarek, M., Maciejewski, J., Wozniak, M., Kuca, P., & Zielinski, J. (2008). Prevalence, severity and underdiagnosis of COPD in the primary care setting. *Thorax*, *63*(5), 402-407.

Carré, P. C., Roche, N., Neukirch, F., Radeau, T., Perez, T., Terrioux, P., Ostinelli, J., Pouchain, D., & Huchon, G. (2008). The effect of an information leaflet upon knowledge and awareness of COPD in potential sufferers. A randomized controlled study. *Respiration; International Review of Thoracic Diseases*, *76*(1), 53-60.

Choi, J. Y., & Rhee, C. K. (2020). Diagnosis and Treatment of Early Chronic Obstructive Lung Disease (COPD). *Journal of Clinical Medicine*, *9*(11), 3426. doi:10.3390/jcm9113426

Çolak, Y., Nordestgaard, B. G., Vestbo, J., Lange, P., & Afzal, S. (2019). Prognostic significance of chronic respiratory symptoms in individuals with normal spirometry. *The European Respiratory Journal*, *54*(3), 1900734. doi:10.1183/13993003.00734-2019

de Queiroz, M. C., Moreira, M. A., Jardim, J. R., Barbosa, M. A., Minamisava, R., Gondim, H.delC., Velasco, F. C., & Penhavel, M. V. (2014). Knowledge about COPD among users of primary health care services. *International Journal of Chronic Obstructive Pulmonary Disease*, *10*, 1-6. doi:10.2147/COPD.S71152

Ghorpade, D. D., Raghupathy, A., Londhe, J. D., Madas, S. J., Kale, N. V., Singh, N. A. P., Patil, R. S., Barne, M. S., Doke, P. P. R., & Salvi, S. S. (2021). COPD awareness in the urban slums and rural areas around Pune city in India. *NPJ Primary Care Respiratory Medicine*, *31*(1), 6. doi:10.1038/s41533-021-00220-4

Grant, T., Brigham, E. P., & McCormack, M. C. (2020). Childhood Origins of Adult Lung Disease as Opportunities for Prevention. *The Journal of Allergy and Clinical*

Immunology. In Practice, *8*(3), 849-858. doi:10.1016/j.jaip.2020.01.015

Guerra, S., & Martinez, F. D. (2020). The Complex Beginnings of Chronic Obstructive Pulmonary Disease. *American Journal of Respiratory and Critical Care Medicine*, *201*(6), 641-642. doi:10.1164/rccm.201912-2363ED

Hwang, Y. I., Park, Y. B., Yoon, H. K., Kim, T. H., Yoo, K. H., Rhee, C. K., Park, J. H., Jang, S. H., Park, S., Kim, J. H., et al. (2019). Male current smokers have low awareness and optimistic bias about COPD: field survey results about COPD in Korea. *International Journal of Chronic Obstructive Pulmonary Disease*, *14*, 271-277. doi:10.2147/COPD.S189859

Li, L. S. K., Williams, M. T., Johnston, K. N., Frith, P., Hyppönen, E., & Paquet, C. (2020). Parental and life-course influences on symptomatic airflow obstruction. *ERJ Open Research*, *6*(1), 00343-2019. doi:10.1183/23120541.00343-2019

López-Pintor, E., Grau, J., & Lumbreras, B. (2021). Patient's awareness on COPD is the strongest predictor of persistence and adherence in treatment-naïve patients in real life: a prospective cohort study. *BMC Pulmonary Medicine*, *21*(1), 388. doi:10.1186/s12890-021-01754-6

Ma, Y., Peng, Y., Chen, P., Nie, N., & Chen, Y. (2019). Assessment of COPD-Related Knowledge Among Internal Medicine Nurses: A Cross-Sectional Study. *International Journal of Chronic Obstructive Pulmonary Disease*, *14*, 2917-2925. doi:10.2147/COPD.S232055

Moreira, M. A., Barbosa, M. A., Jardim, J. R., Queiroz, M. C., & Inácio, L. U. (2013). Chronic obstructive pulmonary disease in women exposed to wood stove smoke. *Revista da Associacao Medica Brasileira*, *59*(6), 607-613.

Pahal, P., Hashmi, M. F., & Sharma, S. (2022). Chronic Obstructive Pulmonary Disease Compensatory Measures. In StatPearls. StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK525962/

Pal, A., Howarth, T. P., Rissel, C., Messenger, R., Issac, S., Ford, L., Connors, C., & Heraganahally, S. (2022). COPD disease knowledge, self-awareness and reasons for hospital presentations among a predominately Indigenous Australian cohort: a study to explore preventable hospitalisation. *BMJ Open Respiratory Research*, *9*(1), e001295. doi:10.1136/bmjresp-2022-001295

Petersen, H., Sood, A., Polverino, F., Owen, C. A., Pinto-Plata, V., Celli, B. R., & Tesfaigzi, Y. (2018). The Course of Lung Function in Middle-aged Heavy Smokers: Incidence and Time to Early Onset of Chronic Obstructive Pulmonary Disease. *American Journal of Respiratory and Critical Care Medicine*, *198*(11), 1449-1451. doi:10.1164/rccm.201805-0861LE

Thakrar, R., Alaparthi, G. K., Kumar, S. K., Vaishali, K., Zulfeequer, C. P., & Aanad, R. (2014). Awareness in patients with COPD about the disease and pulmonary rehabilitation: A survey. *Lung India: official organ of Indian Chest Society*, *31*(2), 134-138. doi:10.4103/0970-2113.129837

Uzel, F. I., Karadağ, P., Önür, S. T., Turan, D., Yentürk, E., & Tuncay, E. (2017). A Basic Question: Are Patients with Chronic Obstructive Pulmonary Disease Aware of Their Disease?. *Turkish Thoracic Journal*, *18*(4), 114-118. doi:10.5152/TurkThoracJ.2017.16048

White, R., Walker, P., Roberts, S., Kalisky, S., & White, P. (2006). Bristol COPD Knowledge Questionnaire (BCKQ): testing what we teach patients about COPD. *Chronic Respiratory Disease*, *3*(3), 123-131.

Wijnant, S. R. A., De Roos, E., Kavousi, M., Stricker, B. H., Terzikhan, N., Lahousse, L., & Brusselle, G. G. (2020). Trajectory and mortality of preserved ratio impaired spirometry: the Rotterdam Study. *The European Respiratory Journal*, *55*(1), 1901217. doi:10.1183/13993003.01217-2019

Woodruff, P. G., Barr, R. G., Bleecker, E., Christenson, S. A., Couper, D., Curtis, J. L., Gouskova, N. A., Hansel, N. N., Hoffman, E. A., Kanner, R. E., et al. (2016). Clinical Significance of Symptoms in Smokers with Preserved Pulmonary Function. *The New England Journal of Medicine*, *374*(19), 1811-1821. doi:10.1056/NEJMoa1505971