



AN OVERVIEW OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE “COPD” DIAGNOSIS AND MANAGEMENT: LITERATURE REVIEW

Alanazi Osama Mazha M¹, Alanazi Abdulmajeed Sard O², Al Shakarh Mohammed Khalil D², Alaliwat Ghadeer Ali H³, Adawi Yahya Ahmed M⁴, Alanazi Sultan Mudhhi H², Alshammari Mashaal Rasheed M^{2*}, Hadi Ahmed Alshehri⁵, Salihah Yahya Al Mani⁶, Khalil Naeem Abujabr⁷, Reem Hazem Mohammed⁸

1. *Cardiology Department, Prince Abdullah Bin Msaed Cardiac Centre, Arar, Saudi Arabia*
2. *Faculty of Medicine, Northern Border University, Arar, KSA*
3. *Faculty of Medicine, Arabian Gulf University, Manama, Bahrain*
4. *Department of Medicine, Bish General Hospital, Jazan, Saudi Arabia*
5. *Faculty of Medicine, King Khalid University, Abha, KSA*
6. *Faculty of Medicine, Najran University, Najran, KSA*
7. *Faculty of Medicine, Dar Al Uloom University, Riyadh, KSA.*
8. *Faculty of Medicine, Ibn Sina National College, Jeddah, KSA*

ARTICLE INFO

Received:

12 May 2020

Received in revised form:

18 Aug 2020

Accepted:

20 Aug 2020

Available online:

28 Aug 2020

Keywords: COPD, Epidemiology, Pathogenesis, Presentation, Investigations, GOLD, Diagnosis, Management.

ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a critical form of slowly progressive pathological changes that occurs in the pulmonary system resulting in the central and peripheral airway and parenchymal destruction. In 2015, chronic obstructive pulmonary diseases are known to be the cause of more than 3 million (5%) deaths around the world. By the end of 2020, it is postulated that COPD would be the third most killing disease in the world. The chronic obstructive pulmonary disease has often received little attention worldwide and often is usually underdiagnosed. Past medical history, family history, and physical examination are the core stone of diagnosis for COPD patients. **Objective:** To assist physicians' approach towards COPD by defining the epidemiological importance of the disease, pathogenesis, clinical expression, and up to date therapeutic modalities. **Methodology:** This review is based on various updated and published data that were collected from PubMed websites. Multiple journals, articles, and documents on this engine were searched. **Conclusion:** Physicians must determine and understand COPD GOLD assessment strategies to adopt appropriate inpatient and outpatient management plan for the patient.

Copyright © 2013 - All Rights Reserved - Pharmacophore

To Cite This Article: Alanazi Osama Mazha M, Alanazi Abdulmajeed Sard O, Al Shakarh Mohammed Khalil D, Alaliwat Ghadeer Ali H, Adawi Yahya Ahmed M, Alanazi Sultan Mudhhi H and *et al.*, (2020), "An Overview of Chronic Obstructive Pulmonary Disease “COPD” Diagnosis and Management: Literature Review”, *Pharmacophore*, 11(4), 150-153.

Introduction

Chronic obstructive pulmonary disease (COPD) is a critical form of slowly progressive pathological changes that occur in the pulmonary system resulting in the central and peripheral airway and parenchymal destruction [1-4]. COPD exacerbations are treatable and preventable according to the exacerbation severity assessment. [5] The severity of the chronic obstructive pulmonary disease depends on the target organ functional impairment and the pathogenicity of the disease that involves associated endogenous and exogenous risks in all ages. [6] Although, there have been various modified efforts to ensure optimal therapy in both inpatients and outpatients of COPD, many patients constantly struggle with chronic obstructive pulmonary disease symptoms daily. [7] The global burden of chronic obstructive pulmonary disease has represented as one of the most challenging diseases for health care professionals. The chronic obstructive pulmonary disease has often received little attention is usually underdiagnosed. [7, 8] This has promoted chronic obstructive pulmonary diseases globally as the third

Corresponding Author: Alshammari, Mashaal Rasheed M; Faculty of Medicine, Northern Border University, Arar, KSA. Email: Mshail27sh@gmail.com

leading cause of death. [9] This review will explore and examine several pathological factors, clinical interventions, and therapeutic measures to improve the physician’s assessment of patients with COPD exacerbation.

Methodology

This review is based on various updated and published data that were collected from PubMed websites. Multiple journals, articles, and documents on this engine were searched and these terms were found on abstract or title (“COPD “[Mesh] AND “Adult” Mesh] AND “Epidemiology”[Mesh] AND “Pathogenesis” [Mesh] AND “Presentation”[Mesh] AND “Diagnosis” [Mesh] AND “Management”[Mesh] AND “GOLD” [Mesh])). In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics; COPD, approach, epidemiology, pathophysiology, diagnosis, and management. Exclusion criteria were all other articles that did not have one of these topics as their primary endpoint.

Review

Epidemiology

Chronic obstructive pulmonary disease is considered one of the most prevalent diseases worldwide. By the end of 2020, it is postulated that COPD would be the third most killing disease in the world. [10] It is highly prevalent in individuals exposed to airborne pollutants and tobacco smoke. However, chronic obstructive pulmonary disease is usually misdiagnosed with a large prevalence variation estimated between 3%-21%. [11] In 2015, chronic obstructive pulmonary diseases are known to be the cause of more than 3 million (5%) deaths around the world. [12]

Pathogenesis

Chronic obstructive pulmonary disease (COPD) is known to have complex pathogenesis and is a critical form of slowly progressive pathological changes that occurs in pulmonary system resulting in the central and peripheral airway and parenchymal destruction. [5] It is also believed that since the bronchial tree is healthy or COPD individuals is not sterile, the lung microbiome and the bacterial community also participates and manipulates in the inflammatory response and the pathogenesis of the chronic obstructive pulmonary disease. [13] Toxic smoke and chemical particles also influence inflammatory mechanisms and induce COPD exacerbations and functional alterations in the pulmonary system. [14] The pathogenesis of chronic obstructive pulmonary disease is often described based on architectural alterations and morphological changes that are triggered by inflammatory mediators. The histopathological features differ in all chronic obstructive pulmonary disease according to the new pathological alteration triad of COPD (Table 1). [15]

Table 1: Histopathological features of COPD [15]

Emphysema	<ul style="list-style-type: none"> - Proximal acinar emphysema • Distal alveoli are spared while there is a massive bronchioles destruction. -Panacinar emphysema • Respiratory bronchioles destruction up to the terminal alveoli
Airway alterations	<ul style="list-style-type: none"> - Smoker’s bronchitis - Terminal and respiratory Bronchioles fibrosis - Terminal bronchioles reduction - Metaplasia of the goblet cells or squamous cells
Vasculature alterations	<ul style="list-style-type: none"> - Collagen deposition and thickened smooth muscles - Hyperplasia of the smooth muscles

Diagnosis

Presentation:

COPD exacerbations are usually presented in form of progressive dyspnea, productive cough, wheezes, and chest tightness. [16] If these symptoms are found to be absent COPD is ruled out as obstructive airway diseases are not known to reflect systemic symptoms. On examination, abnormal paradoxical inspiratory movement of the costal margin is also known as Hoover’s sign. Occasionally, advanced forms of emphysema produce Barrel chest deformity. [17] Table 2 Lists other popular physical findings on examination. Past medical history, family history, and physical examination are valuable for COPD patients. Past History of exposure to cigarette smoke, secondhand smoke, and environmental exposures in most cases should be questioned. Family history of COPD specifically also raises the rates of suspicion. On the other hand, many elderly patients’ presentations compared to young adults differ in terms of severity and comorbidity. Elderly individuals can present with other diseases such as diabetes mellitus, cardiac disease, hypertension, psychological disorders, and osteoporosis. [18]

Table 2: Clinical findings on physical examination:

General [19]	<ul style="list-style-type: none"> Respiratory distress Muscle wasting
Lungs [17]	<ul style="list-style-type: none"> Use of accessory muscle Wheezes Air limitation due to prolonged expiration

	Pursed lip breathing
Chest [17]	Chest wall deformity
Skin [20]	Central cyanosis
Extremities [19]	Digital clubbing Oedema on the lower extremities (Right heart failure cases)

Evaluation

In 2017, an internationally recognized program (Global Initiative for Chronic Obstructive Lung Disease-GOLD) suggested an assessment strategy for confirming COPD diagnosis and management. The program recommends an assessment tool to assist physicians to determine the severity of symptoms using FEV₁, after COPD confirmation by spirometry and also recommends the choice of therapy. The severity of symptoms usually depends on the degree of dyspnea on a scale in a range of 1-4 on GOLD classification. GOLD also suggested ABCD categorization in pharmacological management to decide a patient's response initial treatment plan and whether to continue or discontinue or maintain the current regimen therapy. In 2019, there have been confusions related to in GOLD ABCD regimen is recommended not to be used for a patient on maintenance therapy and provides more than one choice. [19]

Laboratory testing and radiographic imaging are recommended as part of an initial evaluation of COPD. COPD often requires blood count assessment for anemia and infections, alpha-1antitrypsin is assessed to check for other possible causative risks. [21] Chest x rays and CT tomography in radiographic imaging defines chronic cases of bronchitis, bronchiectasis, centrilobular emphysema, and malignancy. [22, 23]

Treatment

The key role of pharmacological treatment is to control and reduce exacerbations and improve quality of care. The initial drug for COPD is a Long-acting muscarinic antagonist (LAMA) and is usually given for mild symptoms and no exacerbations. For patients with more severe symptoms, it is preferred for more effective results to prescribe combined both Long-acting muscarinic antagonist with a selective long-acting beta₂-agonist (LABA) in a single inhaler. It is known that monotherapy is not recommended while using glucocorticoids. Glucocorticoids are usually combined with fluticasone and salmeterol to prevent sudden death. Methylxanthines are used after LABA or LAMA treatment as an airway smooth muscle relaxant and cause mild bronchodilation. [19, 24]

COPD can be managed in an inpatient or outpatient it depends on the severity. Proposed COPD hospitalization, discharge, and follow-up plan listed in (Table 3). [5, 24]

Table 3: Proposed COPD hospitalization, discharge, and follow-up plan [5, 24]

Severity	Management
Mild exacerbation	Optimize bronchodilators inhalations then assign for discharge
Moderate exacerbation	-Optimize bronchodilators and oral corticosteroids. If sputum is detected give antibiotics then assign for discharge. -Prepare for a pulmonary rehabilitation plan and smoking cessation. -Follow and re-assessment in 90 days, give the anti-pneumococcal vaccine.
Severe exacerbation	-Start with oral corticosteroids -Consider antibiotic in dyspnea, increased sputum purulence and volume, and if mechanical ventilation is installed. -Use Xanthine's if there is no response. - Prevent the occurrence of pulmonary thromboembolism. - If hypoxemic hospitalize with oxygen and non-invasive ventilation if hypercapnia. -Prepare for a pulmonary rehabilitation plan and smoking cessation. -Follow and re-assessment in 30 days, give the anti-pneumococcal vaccine.
Very Severe exacerbation	ICU admission and oxygen administration in hypoxemic.

Conclusion

Chronic obstructive pulmonary disease (COPD) is a complex disease with multiple pathogenic mechanisms. Clinically, patients will receive better management outcomes when physicians understand the clinical setting on taking a history, physical examination, and performing laboratory and imaging workups. Moreover, COPD treatment depends on the severity of the disease. Physicians must determine and understand COPD GOLD assessment strategies to adopt appropriate inpatient and outpatient management plan for the patient.

References

1. Azzam M.E, Mohamed A.S, Shawky H.A, Ahmed T, Nossier A.M, Morcos M.A, Ali M. G. Early outcome of fallot repair with preservation of the pulmonary valve annulus versus transannular patch. *J. Adv. Pharm. Educ. Res.* 2018;8(1):1-6.
2. Mohamed A.M, Badr N.M, Hagag A.A, Mohamed Y.M. Intra versus extra-thoracic oscillations in chronic obstructive Pulmonary disease (A randomized clinical trial). *J. Adv. Pharm. Educ. Res.* 2019;9(3):85-90.
3. Al Abusaab AH, Alamri AA, Altheyab AS, Alqahtani RM, Alahdal ET, Aloffui EA, Bokhamseen HA, Mobarki WM, Aldawsari WM, Aljifry SK. Evolution Role of Imaging Techniques in Diagnosis and Management of Pulmonary Embolism. *Arch. Pharma. Pract.* 2019;10(1): 15-8.
4. Sangi H, Alotaibi N.M, Ahmedani E. I, Muhammad S, Sangi A. The Effect of Nigella Sativa, and Metformin on the Changes in Liver, Heart, and Kidney Caused by DM in Experimental Animals. *Int. j. pharm. res. Allied sci.* 2020;9(2):15-23.
5. Reis AJ, Alves C, Furtado S, Ferreira J, Drummond M, Robalo-Cordeiro C. COPD exacerbations: management and hospital discharge. *Pulmonology.* 2018;24(6):345-350.
6. Soriano JB, Polverino F, Cosio BG. What is early COPD and why is it important? *Eur Respir J.* 2018;52(6) 23-31.
7. Criner RN, Han MK. COPD Care in the 21st Century: A Public Health Priority. *Respir Care.* 2018;63(5):591-600.
8. López-Campos JL, Tan W, Soriano JB. Global burden of COPD. *Respirology.* 2016;21(1):14-23.
9. Viniol C, Vogelmeier CF. Exacerbations of COPD. *Eur Respir Rev.* 2018;27(147).
10. Gloeckl R, Schneeberger T, Jarosch I, Kenn K. Pulmonary Rehabilitation and Exercise Training in Chronic Obstructive Pulmonary Disease. *Dtsch Arztebl Int.* 2018;115(8):117-123.
11. Ho T, Cusack RP, Chaudhary N, Satia I, Kurmi OP. Under- and over-diagnosis of COPD: a global perspective. *Breathe (Sheff).* 2019;15(1):24-35.
12. Global, regional, and national deaths, prevalence, disability-adjusted life years, and years lived with disability for chronic obstructive pulmonary disease and asthma, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet Respir Med.* 2017;5(9):691-706.
13. Wang L, Hao K, Yang T, Wang C. Role of the Lung Microbiome in the Pathogenesis of Chronic Obstructive Pulmonary Disease. *Chin Med J (Engl).* 2017;130(17):2107-2111.
14. Hikichi M, Mizumura K, Maruoka S, Gon Y. Pathogenesis of chronic obstructive pulmonary disease (COPD) induced by cigarette smoke. *J Thorac Dis.* 2019;11(Suppl 17): S2129-s2140.
15. Berg K, Wright JL. The Pathology of Chronic Obstructive Pulmonary Disease: Progress in the 20th and 21st Centuries. *Arch Pathol Lab Med.* 2016;140(12):1423-1428.
16. Michaudet C, Malaty J. Chronic Cough: Evaluation and Management. *Am Fam Physician.* 2017;96(9):575-580.
17. Sarkar M, Bhardwaz R, Madabhavi I, Modi M. Physical signs in patients with chronic obstructive pulmonary disease. *Lung India.* 2019;36(1):38-47.
18. Ko FWS, Chan KP, Hui DSC. Comprehensive care for chronic obstructive pulmonary disease. *J Thorac Dis.* 2019;11(Suppl 17): S2181-s2191.
19. Singh D, Agusti A, Anzueto A, et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease: the GOLD science committee report 2019. *Eur Respir J.* 2019;53(5) 33-42.
20. Changizi M, Rio K. Harnessing color vision for visual oximetry in central cyanosis. *Med Hypotheses.* 2010;74(1):87-91.
21. Xiong W, Xu M, Zhao Y, Wu X, Pudasaini B, Liu JM. Can we predict the prognosis of COPD with a routine blood test? *Int J Chron Obstruct Pulmon Dis.* 2017;12:615-625.
22. Martinez-Garcia MA, Miravittles M. Bronchiectasis in COPD patients: more than a comorbidity? *Int J Chron Obstruct Pulmon Dis.* 2017;12:1401-1411.
23. Bodduluri S, Reinhardt JM, Hoffman EA, Newell JD, Jr., Bhatt SP. Recent Advances in Computed Tomography Imaging in Chronic Obstructive Pulmonary Disease. *Ann Am Thorac Soc.* 2018;15(3):281-289.
24. Celli BR, Wedzicha JA. Update on Clinical Aspects of Chronic Obstructive Pulmonary Disease. *N Engl J Med.* 2019;381(13):1257-1266.