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AYURVEDIC APPROACH TO ASTHMA-COPD OVERLAP: A STUDY OF RESPIRATORY DISEASES

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ABSTRACT

Asthma-COPD Overlap (ACO) is a condition where a person experiences symptoms of both asthma and chronic obstructive pulmonary disease (COPD). In *Ayurveda,* this can be understood using the concepts of *Anukta Vyadhi, Nidanarthakara Roga*, and *Vyadhi Sankara*. Since ACO does not fit exactly into any single disease described in classical *Ayurvedic* texts, it can be considered an *Anukta Vyadhi* (unclassified disease). It also follows the principle of *Nidanarthakara Roga*, where one disease leads to another. For example, if asthma remains untreated for a long time, it can gradually cause COPD-like symptoms. Additionally, ACO represents *Vyadhi Sankara*, where two diseases coexist with overlapping causes and symptoms, making it difficult to differentiate between them.

In *Ayurveda,* ACO is primarily caused by an imbalance of *Vata* and *Kapha doshas*, leading to obstruction in the respiratory channels (*Pranavaha Srotas*). Long-term exposure to pollutants, dust, smoking, and other irritants further worsens the condition. By understanding ACO

through these *Ayurvedic* principles, an integrative treatment approach can be developed for better disease management and improved patient outcomes.

Keywords: Asthma-COPD Overlap, Ayurveda, *Anukta Vyadhi*, *Nidanarthakara Roga, Vyadhi Sankara*

INTRODUCTION:

Asthma-COPD Overlap (ACO) is a condition where individuals exhibit symptoms of both asthma and COPD, leading to chronic breathing difficulties. It was officially recognized in the 2014 GINA/GOLD guidelines, though earlier studies discussed the overlap. The term "syndrome" has since been dropped due to its heterogeneous nature **[1]**. ACO presents challenges in modern medicine as it involves both reversible airways narrowing (asthma) and irreversible lung damage (COPD). Ayurveda does not yet recognize ACO, which may result in improper treatment. Understanding ACO is crucial for optimizing patient care, improving lung function, and managing cases unresponsive to conventional treatments.

MATERIALS AND METHODS

References have been collected from modern medical books, Ayurveda texts, related websites, and articles. After going through these sources, an effort has been made to reach conclusions based on the review, observations, and discussions of the concepts.

Asthma COPD Overlap

Asthma and chronic obstructive pulmonary disease (COPD) are two common lung diseases that affect breathing. They share similar symptoms, like trouble breathing and blocked airways, and often show similar results on lung function tests. Because of these similarities, doctors use the term "asthma-COPD overlap" (ACO) for cases where someone has both asthma and COPD symptoms. The term was first introduced by Gibson in 2009 **[2]**.

The presence of airflow obstruction in individuals with a history of asthma and older than 40 years. ACO is a condition where a person has signs of both asthma and COPD. This may include a good response to bronchodilators (medications that help open the airways) and a high number of eosinophils (a type of white blood cell that shows inflammation**).** Although ACO is becoming more recognized, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) does not yet officially call it a separate condition, because there is no clear, agreed-upon definition. This makes diagnosing and treating ACO more challenging **[3]**.

Aetiology

There is no distinct cause for ACO. The causes are usually a combination of both COPD and asthma causes. This includes

cigarette smoking, genetic factors and environmental factors.

Epidemiology

The prevalence of ACO has shown significant variation across studies: ranging from 0.9% to 11.1% in the general population, 11.1% to 61.0% among asthma patients, and 4.2% to 66.0% in COPD patients **[4]**.

Pathology

Asthma [5]

Asthma involves airway inflammation and obstruction due to an immune imbalance favoring Th2 cells, which release IL-4, IL-5, and IL-13, increasing IgE production. IgE binds to mast cells, triggering histamine and leukotriene release, causing airway swelling and muscle tightening. Airflow obstruction results from bronchoconstriction, inflammation, mucus buildup, and long-term airway remodelling. AERD occurs when NSAIDs increase leukotrienes, worsening asthma. Occupational asthma arises from workplace irritants, either immune-related (allergic) or non-immune (direct irritation). Symptoms improve when triggers are avoided. Managing asthma involves reducing inflammation, controlling triggers, and preventing structural airway damage to maintain better breathing function.

COPD [6, 7] COPD is a chronic inflammatory lung disease. Diseases come under COPD: ICD 10:

1. Chronic bronchitis
2. Emphysema
3. Asthma COPD overlap

It is caused by oxidative stress and an imbalance between proteases and antiproteases. Emphysema, a structural component of COPD, results from alveolar destruction due to excessive protease activity, often triggered by smoking. This leads to reduced elastic recoil and airway collapse during exhalation. Alpha-1 Antitrypsin Deficiency (AATD) causes genetic emphysema, primarily affecting the lower lung lobes. COPD leads to airflow limitation, gas trapping, and hyperinflation, which can progress to pulmonary hypertension. Acute exacerbations, often triggered by infections or irritants, worsen inflammation and breathing difficulties, requiring corticosteroids and bronchodilators for symptom management.

ACO

Asthma and COPD are caused by different processes in the body. However, two theories explain how Asthma-COPD Overlap (ACO) develops. The Dutch hypothesis, suggested by Dick Orie in the 1960s, says that asthma and COPD share the same genetic factors but are triggered by different environmental factors. In ACO, a person shows signs of both diseases because they have been exposed to these environmental factors, making it hard to separate the two.

The British hypothesis, proposed in 1965, says that ACO has features of both COPD and asthma. It points out that smoking is a risk factor for asthma, while things like allergies are linked to COPD. The theory also highlights that exposure to harmful substances, such as tobacco smoke and indoor air pollution, plays a major role in causing ACO **[8]**.

Clinical Manifestation

People suffering from ACO have symptoms of both asthma as well as COPD.

Symptoms of asthma include-

- Shortness of breath
- Chest tightness or pain
- Wheezing when exhaling, which is a common sign of asthma in children
- Trouble sleeping caused by shortness of breath, coughing or wheezing
- Coughing or wheezing attacks that are worsened by a respiratory virus, such as a cold or the flu

Symptoms of COPD include-

- Trouble catching your breath, especially during physical activities.
- Wheezing or whistling sounds when breathing.
- Ongoing cough that may bring up a lot of mucus. The mucus may be clear, white, yellow or greenish.
- Chest tightness or heaviness.
- Lack of energy or feeling very tired.
- Frequent lung infections.
- Losing weight without meaning to. This may happen as the condition worsens.
- Swelling in ankles, feet or legs.

The Most Important Clinical Feature of the GOLD parameter is [9]

1. Patients with COPD typically complain of dyspnea, activity limitation and/or cough with or without sputum production and may experience acute respiratory events characterised by increased respiratory symptoms called “Exacerbations” that require specific preventive and therapeutic measures.

2. Patients with COPD frequently harbour other comorbid diseases that influence their clinical condition and prognosis and require specific treatment as well. These comorbid conditions can mimic and/or aggravate an “Acute exacerbation.”

3. The presence of non-fully reversible airflow obstruction (FEV1/FVC < 0.7 of COPD. Measured by spirometry confirms the diagnosis. (Global Initiative for Chronic Obstructive Lung Disease 2024 Report pg no. 04)

i.e. MMRC grade: -

- Dyspnea only with strenuous exercise ---------- 0
- Dyspnea when hurrying or walking up a slight hill---------- +1

- Walks slower than people of the same age because of dyspnea or has to stop for breath when walking at their own pace---------- +2
- Stops for breath after walking 100 yards (91 m) or after a few minutes +3
- Too dyspnoeic to leave the house or breathless when dressing---------- +4

People with ACO tend to have symptoms more often than those with asthma or COPD alone, and they usually experience decreased lung function. Common symptoms include:

- Difficulty breathing
- Excess mucus production
- Fatigue
- Frequent coughing
- Shortness of breath
- Wheezing

Those with ACO typically have more symptoms and more intense flare-ups than individuals with just asthma or COPD, which may lead to more frequent emergency room visits and hospital stays. Identifying ACO is crucial, as it can be more serious than having asthma or COPD by itself **[9, 10]**.

Diagnosis

Asthma, COPD and ACO are diagnosed on the basis of-

1. Age of onset
2. Pattern of respiratory symptoms
3. Lung function
4. Past history or family history
5. Chest X-ray
6. Episodes or flare-ups
7. Airway inflammation
8. Smoking
9. History of exposure to lung irritants

***Ayurvedic* Aspect**

Concept of *Anukta Vyadhi*

In *Ayurveda*, diseases are classified into *Ukta Vyadhi* (known diseases) and *Anukta Vyadhi* (new or unlisted diseases). *Anukta Vyadhi* refers to health conditions not specifically described in classical *Ayurvedic* texts like *Charaka Samhita, Sushruta Samhita,* and *Ashtanga Hridaya*. However, *Ayurveda* can still analyse and treat these conditions by assessing *dosha* imbalances, affected body channels (*Srotas)*, and the overall disease process.

With time, new diseases emerge due to changes in lifestyle, environment, and diet. *Ayurveda* offers a flexible approach to diagnosing and managing such conditions. Asthma-COPD Overlap (ACO) is not directly mentioned in classical Ayurvedic texts, but it can be understood through the concept of *Anukta Vyadhi.* In *Charaka Samhita Vimanasthana* 4th Chapter, *Acharya Charaka* explained the sequenced parameter, which one should follow to get the detail about the Ukta Vyadhi and *Anukta*

Vyadhi. Following are the parameters explained in the verse-

1. ***Evum-prakopanam*** **(Predisposing Factors-** ***Nidana)***

- Excess exposure to dust (*Rajasa*), smoke (*Dhooma*), cold air (*Sheeta Vata*).
- Excess physical exertion (*Vyayama, Adhwa*)
- Excess intake of heavy *(Guru),* dry (*Ruksha),* cold *(Sheeta),* food substances, which is the cause of obstruction in *Srotas* (*Abhishyanda Ahara*), *Kapha* vitiating substances.
- Individual undergoing excess *Shodhana* (purificatory therapy) line of treatment excessively.

2. ***Evum-yoni*** **(Nature of disease)**

Chronic respiratory disorder with persistent airflow limitation, inflammation, and obstruction.

3. ***Evum-utthana*** **(Causative factors,** ***Dosha*** **Involvement*)***

Vata and Kapha doshas with secondary involvement of *Pitta dosha* in later stages.

- ***Vata Dosha*** → Causes irregular airflow *(Kupitam)*, airway hyper-responsiveness *(Ati Srushta),* and dry coughing with dyspnoea *(Ati-Baddha)* and exacerbation *(Alpaalpam-abhikshum).*
- ***Kapha Dosha*** → Causes mucus accumulation *(Ati Baddha),* and airway blockage (Dry or wet cough - added sound) with an inflammation *(Kupitam).*

Pitta Dosha (in chronic condition probably in old age > 40) → Causes inflammation *(Shotha),* heat *(Raga),* and irreversible damage to alveoli *(Pakatva).*

4. ***Evum-Aatmanam*** **(Chief Complaints)**

Exacerbation (Low O2 saturation Level), chronic cough with (wet) or without (dry) phlegm, shortness of breath, wheezing, chest tightness, high grade in MMRC.

5. ***Evum-Adhisthanam*** **(Involved Organ)**

Lungs *(Phuphphusa),* Bronchi *(Kantha & Swasa Marga), Pranavaha Srotas* (Respiratory system) including its *moolasthana (Hridaya)* and *Raktavahi Dhamni* (Blood circulatory system).

6. ***Evum-Vedana*** **(Pain)**

Chest discomfort, painful breathing (Dyspnoea), headache due to hypoxia.

7. ***Evum-Samsthanam Lakshana*** **(Morphological Features)**

Chronic inflammation in bronchial passages, structural lung damage (especially Alveoli) and hyperinflation in COPD cases.

8. ***Evum-Shabda Sparsha Roopa Rasa Gandha*** **(Sensory Characteristics)**

Rugna Shabda: Kshama and *Jarjara shabda.*

Avayava-Vachaka Shabda: Wheezing, breath sounds.

Roopa: Pale complexion, difficulty breathing, cyanosis, hyperinflation (barrel chest), and central cyanosis.

Sparsha: Cold, clammy skin.

Rasa: Altered taste, *Jihva Sa-amatva.*

Gandha: Foul breath due to mucus stagnation.

9. ***Evum-Upadrava*** **(Complications)**

Recurrent lung infections, respiratory failure, pulmonary hypertension, right heart failure (Cor Pulmonale).

10. ***Evum-Vriddhi Kshaya sthana*** **(Progression)**

Vriddhi*:* Aging, addictions (esp. Tobacco in all formats), pollution, exposure towards different antigens (allergens, viruses, bacteria and different chemicals reagents) with age.

Kshaya*:* Proper management, lifestyle changes, *Ayurvedic* treatments and *Bhramari Pranayam.*

11. ***Evum-Udarka*** **(Sequelae)**

Chronic hypoxia, systemic organ damage, oxygen dependency in advanced cases (O2 level at lower side).

12. ***Evum-Naam*** **(Terminology)**

Tamaka Shwasa: Asthma-like; Kshudra Shwasa: Mild dyspnea; Shwasanaka: COPD-like pathology.

13. ***Evum-Yoga*** **(Therapeutic Formulations)**

Haridra (Curcuma longa): Anti-inflammatory; Vasaka (Adhatoda vasica): Bronchodilator; Pippali (Piper longum): Lung function booster; Sitopaladi Churna: Respiratory relief; Agastya Haritaki Rasayana: Lung tissue repair.

14. ***Chikitsa*** **(Treatment Approach)**

Shodhana: Vamana for *Kapha* clearance;

Shamana: Herbal formulations;

Rasayana: Lung strengthening;

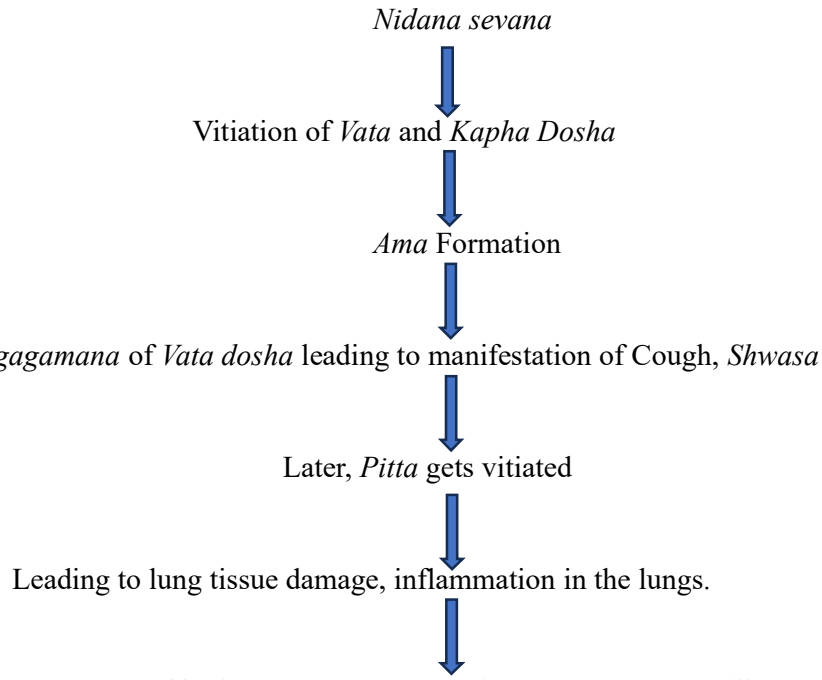
Yoga & *Pranayama: Anulom-Vilom, Bhastrika*;

Lifestyle Modifications: Avoid smoking, maintain nutrition.

15. ***Vikriti*** **(Pathophysiology)**

Vata-Kapha imbalance leads to chronic inflammation and

obstruction, *Ama* accumulation worsens lung function, cycles of aggravation and remission require long-term management.



Other parameters which are not mentioned in the verse but are must to know are as follows-

16. *Dushya*

- *Rasa Dhatu* (Plasma & Fluids) → Impaired fluid regulation leading to excess mucus.
- *Rakta Dhatu* (Blood & Circulation) → Poor oxygenation due to reduced lung function.
- *Mamsa Dhatu* (Muscular Tissue) → Weakness of respiratory muscles.

17. *Srotas*

- *Pranavaha Srotas* (Respiratory System) → Primary site of disease, causing breathlessness, wheezing, and mucus congestion.
- *Udakavaha Srotas& Rasavaha Srotas* (Water Regulation System) → Leads to excessive mucus production.
- *Annavaha Srotas* (Digestive System) → Weak digestion (Mandagni) contributes to the formation of Ama (toxins), worsening the condition.

18. *Srotodushti Prakara*

- *Sanga* (Obstruction) → Mucus accumulation leads to airway narrowing.
- *Vimargagamana* (Reversed direction) → Cough
- *Atipravriti* (Excess Flow) → Excessive mucus.

- *Siragranthi (*Nodular Changes) → Irreversible lung tissue damage in chronic cases.

19. *Agni Dushti*

- *Mandagni* (Weak Digestive Fire) → Leads to Ama (toxins), which further blocks the respiratory channels.
- Improper digestion results in *Kapha* aggravation, leading to mucus formation.

20. *Ama*

- *Jatharagnimandyajanya- Ama* formation due to weak digestion leads to sticky mucus blocking the lungs.
- Aggravated *Kapha* and *Vata* make it difficult to expel *Ama*, leading to chronic inflammation.

21. *Udbhava Sthana*

- *Amashaya*

22. *Vyakta Sthana*

- *Uras* (Chest)

23. *Rogamarga*

- *Abhyantara* and *Bahaya*

24. *Vyadhi Swabhava*

- *Sthira* (Chronic & Persistent) → ACOS symptoms are long-lasting and progressive.
- *Kashtasadhya* (Difficult to Cure) → Irreversible lung changes in advanced cases.
- *Anukta Vyadhi* (Unmentioned Disease) → Not explicitly mentioned in Ayurvedic texts but can be understood through *Tamaka Shwasa* and *Kshudra Shwasa*.

25. *Sadhyaasadhyata*

- *Kashtasadhya* (Difficult to Cure) → Irreversible lung changes.

Concept of *Nidanarthaka Roga* and *Vyadhi Sankara*

Nidanarthaka Roga in ACO

Nidanarthakara Roga refers to a condition where one disease becomes the cause of another. In the case of Asthma-COPD Overlap (ACO), this concept is highly relevant, as long-term asthma or COPD can contribute to the development of overlapping features.

How Asthma Leads to COPD (Nidanarthakara Effect)?

1. Chronic Airway Inflammation: Persistent inflammation in asthma leads to structural changes (airway remodelling), reducing lung function and making it similar to COPD.
2. Repeated Infections: Frequent respiratory infections in asthmatic patients damage lung tissues over time, increasing the risk of COPD.
3. Long-term *Vata-Kapha Imbalance*: Asthma is primarily *Vata-Kapha* dominant. If untreated, *Kapha* accumulation and obstruction in *Pranavaha Srotas* can lead to

permanent airway narrowing, similar to COPD.

How COPD Leads to Asthma-like Symptoms?

1. Increased Airway Sensitivity: COPD patients often develop bronchial hyperresponsiveness, causing asthma-like wheezing and breathlessness.
2. Mucus Blockage & Bronchospasm: Chronic mucus production in COPD increases airway obstruction, making it resemble asthma attacks.
3. *Kapha-Tama Dominance*: In later stages, COPD becomes Kapha-Tama Pradhana, leading to breathlessness and severe airway constriction. This further mimics asthmatic conditions.

Asthma and COPD are interlinked through the *Nidanarthakara* effect, where one condition increases the risk of the other. This highlights the need for early Ayurvedic interventions, including:

- Dosha Balancing (*Vata-Kapha* Management)
- Strengthening Pranavaha Srotas (Respiratory Channels)
- Preventing Chronic Inflammation and Mucus Accumulation

***Vyadhi Sankara* in ACO**

Vyadhi Sankara refers to the simultaneous manifestation of two diseases, creating an overlapping condition with features of both. ACO is a perfect example of this, as it displays characteristics of both asthma (reversible airway obstruction, eosinophilic inflammation) and COPD (irreversible obstruction, neutrophilic inflammation, and lung tissue destruction). In ACO, *Kshaya* (destruction of lung tissue in COPD) and *Avarana* (obstruction in asthma) coexist, making disease management more challenging. Thus, ACO perfectly represents *Vyadhi Sankara*, as it embodies both asthma and COPD, leading to a mixed clinical picture with elements of both diseases.

DISCUSSION

Asthma-COPD Overlap (ACO) is a condition that exhibits features of both asthma and chronic obstructive pulmonary disease (COPD). In the context of *Ayurveda*, it can be analysed through various concepts, including *Anukta Vyadhi* (unexplained/new diseases), *Nidanarthakara Roga* (one disease leading to another), and *Vyadhi Sankara* (co-existence of diseases).

1. ACO and Anukta Vyadhi

Anukta Vyadhi refers to diseases that are not explicitly mentioned in *Ayurvedic* texts but can be understood through fundamental principles of *Dosha, Dhatu*, and *Srotas* dysfunctions. ACO, though not named in *Ayurveda,* can be assessed through:

- *Pranavaha Srotas Dushti*: Involvement of the respiratory

channels, causing chronic inflammation and obstruction.

- *Kapha- Vata Dosha* Imbalance: Asthma is typically *Vata-Kapha Pradhana*, whereas COPD is more *Kapha-Tama* dominant. ACO presents a complex interplay of both.
- *Pitta Dosha – Tridosha prakopa* happened in *Tamaka shwasa rugna* but in the earlier phase *Kapha-Vata* in the dominant phase while *Pitta* in the recessive phase. Later with the disease prognosis, addiction and long-term medication with ageing> 40 years, *Pitta* became more prominent to permanent damage in the Alveolar and other lung tissue. It also hardens the blood circulatory vessels with its *pakatva* towards Arterial stiffness *(Sira – Dhamni Kathinya)* and can be examined with a "Bounding pulse."
- *Ama* and *Sroto-rodha* (blockage of channels): Leads to chronic inflammation and airway remodelling, which is common in ACO.

Thus, ACO can be understood under *Anukta Vyadhi* by analysing its pathophysiology through *Ayurvedic* principles.

2. ACO and Nidanarthakara Roga

Nidanarthakara Roga refers to conditions where one disease acts as a causative factor for another. ACO fits this category because:

- Chronic asthma leads to airway remodelling, predisposing individuals to COPD-like features.
- Recurrent respiratory infections in COPD further aggravate airway hyperreactivity, making it similar to asthma.
- Prolonged *Kapha-Vata Dushti* leads to increased susceptibility to chronic lung conditions.

3. ACO and Vyadhi Sankara

Vyadhi Sankara is the coexistence of two diseases in a single individual where they share common pathological mechanisms. ACO exemplifies this by combining elements of both asthma and COPD:

Airway Hyperresponsiveness (Asthma) + Airflow Limitation (COPD)

Inflammation of Airways (Asthma) + Structural Damage (COPD)

Reversible Bronchoconstriction (Asthma) + Irreversible Airway Remodelling (COPD)

Thus, from an Ayurvedic perspective, Asthma-COPD Overlap can be analysed using these three concepts, helping in understanding its pathology and planning a holistic treatment approach involving *Shodhana* (detoxification), *Shamana* (palliative treatment), *Rasayana* (rejuvenation therapy), and lifestyle modifications.

CONCLUSION

Asthma-COPD Overlap (ACO) is a condition that combines features of both asthma and COPD. In *Ayurveda*, it can be understood using three key concepts:

- *Anukta Vyadhi* (Unexplained Disease): ACO is not directly mentioned in Ayurvedic texts, but its symptoms can be understood through imbalances in *Vata* and *Kapha Dosha*, leading to breathing difficulties and airway blockages. Later phase in Asthma COPD overlaps due to the dominance of *"Pitta Dosha"* in later age >40 years against *Kapha Vata ghanibhoota* due to its *guna* as *"Raga, Pakatva and Kharatva."*
- *Nidanarthakara Roga* (One Disease Causing Another): Long-term asthma can lead to permanent lung damage, making it similar to COPD. Likewise, repeated lung infections in COPD can cause asthma-like symptoms.
- *Vyadhi Sankara* (Combination of Diseases): ACO is a mix of two diseases, where asthma causes airway sensitivity, and COPD causes long-term lung damage.

To manage ACO effectively, Ayurveda suggests a holistic approach, including detoxification *(Shodhana),* herbal treatments *(Shamana),* rejuvenation therapy *(Rasayana),* and lifestyle changes. By balancing the *Doshas* and strengthening the lungs, *Ayurveda* can help improve breathing and overall health in people with ACO.

REFERENCES

[1] Global Initiative for Asthma, Global Initiative for Chronic Obstructive Lung Disease. **Asthma, COPD, and Asthma-COPD Overlap Syndrome (ACOS)** [Internet]. 2014 [cited 2025 Feb 15]. Available from: https://ginasthma.org/wp-content/uploads/2019/11/GINA_GOLD_ACOS_2014-wms.pdf

[2] Gibson PG, Simpson JL. The overlap syndrome of asthma and COPD: what are its features and how important is it? Thorax. 2009 Aug;64(8):728-35. [PubMed]

[3] Fouka E, Papaioannou AI, Hillas G, Steiropoulos P. Asthma-COPD Overlap Syndrome: Recent Insights and Unanswered Questions. J Pers Med. 2022 Apr 28;12(5) [PMC free article] [PubMed]

[4] Uchida A, Sakaue K, Inoue H. Epidemiology of asthma-chronic obstructive pulmonary disease overlap (ACO). Allergology International 2018. https://www.sciencedirect.com/science/article/pii/S1323893018300066

[5] Fabbri L, Luppi F, Beghe B, Rabe KF. Complex chronic comorbidities of

COPD [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2025 Feb 15]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430901/

[6] Patwa A, Shah R. Tracheostomy [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2025 Feb 15]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559281/

[7] Healthline Editorial Team. **Types of COPD** [Internet]. Healthline; 2023 [cited 2025 Feb 15]. Available from: https://www.healthline.com/health/copd/types-of-copd#chronic-bronchitis

[8] Ashfaq A, Khalid S. **Chronic Obstructive Pulmonary Disease** [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2025 Feb 15]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK592422/

[9] MDCalc. **mMRC (Modified Medical Research Council) Dyspnea Scale** [Internet]. MDCalc; 2025 Feb 13 [cited 2025 Feb 15]. Available from: https://www.mdcalc.com/calc/4006/mmrc-modified-medical-research-council-dyspnea-scale

[10] American Lung Association. **Asthma-COPD Overlap Syndrome (ACOS)** [Internet]. 2024 [cited 2025 Feb 15]. Available from: https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/learn-about-asthma/types/asthma-copd-overlap-syndrome