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Chronic Obstructive Pulmonary Disease (COPD): Diagnosis, Pathology, Clinical Presentation and Homoeopathic Management

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ABSTRACT

Chronic Obstructive Pulmonary Disease (COPD) is a very common problem worldwide now a day. COPD is preventable and treatable disease it is characterized by constant airflow limitation that is generally progressive and connected with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the generally severity in individual patients of COPD. It remains a most important reason of morbidity and mortality globally and outcome in an economic and social burden that is both substantial and increasing.

Keywords- COPD, Chronic, Pulmonary disease, Homoeopathy.

I. INTRODUCTION

Internationally, the accepted definition of COPD is as 'A disease state characterized by chronic airflow limitation attributable to chronic bronchitis and emphysema. Chronic bronchitis has been defined in clinical terms: the presence of chronic productive cough for at least three consecutive months in two consecutive years. Additional causes of chronic productive cough should be ruled out. Emphysema, on the other hand, has been distinct by its pathologic description.

The American Thoracic Society defines COPD as "A disease state characterized by the incidence of airflow obstruction due to chronic bronchitis or emphysema; the airflow obstruction is usually progressive, may be accompanied by airway hyper activity, and may be moderately reversible"

1.1 Diagnosis

These symptoms of COPD are not diagnostic themselves, but the existence of various key symptoms increases the possibility of a diagnosis of COPD. Spirometry is required to establish a diagnosis of COPD disease.

Dyspnea- that is progressive in nature (worsens over time) generally aggravate with exercise. constant (present every day) described by the patient as an 'increased effort to breathe, 'heaviness', 'air hunger,' or 'gasping respiration.'

Chronic Cough: May be alternating and might be unproductive.

Chronic sputum production: Any pattern of chronic sputum production may signify COPD.

History of: tobacco smoking.

Exposure to: Occupational dusts and chemicals exposure or radiation

Risk factors: Smoke from home cooking and especially heating fuels.

Table 1: MMRC(Modified Medical Research Council) Dyspnea Scale

Grades	Clinical symptoms
0	Breathless only with strenuous exercise
1	Short of breath when hurrying on the level or up a slight hill.
2	Slower than most people of the same age on a level surface
3	Stop for breath walking 100 meters

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4	Too breathless to leave the house or breathless when dressing or undressing.

1.2 Pathology

Cigarette smoke exposure may affect the large airways, small airways (≤2 mm diameter), and alveolar space. Whereas changes in large airways cause cough and sputum, changes in small airways and alveoli are responsible for physiologic alterations. Emphysema and small airway pathology are both present in most persons with COPD and their relative contributions to obstruction vary from one person to another.

1.3 Large Airway

Smoking of cigarette often outcome in mucous gland swelling and goblet cell hyperplasia. These changes are comparative to cough and mucus creation that characterize chronic bronchitis, but these abnormalities are not associated to airflow limitation. Goblet cells not only increase in number but also in extent through the bronchial tree. 11 Bronchi also undergo squamous metaplasia, which not only predisposes to carcinogenesis but also disrupts mucociliary clearance. While not as major as in asthma, patients may have smooth muscle hypertrophy and bronchial hyper reactivity, important to airflow restriction. Neutrophil influx has been associated with purulent sputum of upper respiratory tract infections that hamper patients with COPD. Independent of its proteolytic movement, neutrophil elastase is surrounded by the the majority potent secretagogues recognized.

1.4 Small Airways

The major site of increased resistance in most individuals with COPD is in airways ≤2 mm diameter. distinguishing cellular changes consist of goblet cell metaplasia and replacement of surfactant-secreting Clara cells with mucus-secreting and infiltrating mononuclear inflammatory cells. Smooth muscle hypertrophy may also be present. These abnormalities may cause luminal narrowing by excess mucus, edema, and cellular infiltration. Reduced surfactant may expand surface tension at the air-tissue interface, predisposing to airway narrowing or collapse. Fibrosis in the wall may cause airway thinning directly or, as in asthma, predispose to hyperreactivity. Respiratory bronchiolitis with mononuclear inflammatory cells collecting in distal airway tissues may cause proteolytic destruction of elastic fibers in the respiratory bronchioles and alveolar ducts where the fibers are concentrated as rings around alveolar entrances.

1.5 Lung Parenchyma

Emphysema is characterized by destruction of gas exchanging airspaces (i.e., the respiratory bronchioles,alveolar ducts, and alveoli). Their walls develop into perforated and later obliterated with coalescence of tiny distinct airspaces into irregular and greatly larger airspaces.

Macrophages accumulate in respiratory bronchioles of essentially all young smokers. Bronchoalveolar lavage fluid from such individuals contains roughly five times as many macrophages as lavage from nonsmokers. In smoker‘slavage fluid, macrophages comprise >95% of the total cell count, and neutrophils, nearly absent in nonsmoker's lavage, account for 1–2% of the cells.T lymphocytes, particularly CD8+ cells, are also increased in the alveolar space of smokers. Emphysema is classified into distinct pathologic variety, the most significant being centriacinar and panacinar. Centriacinar emphysema, the variety most often connected with cigarette smoking, is characterized by enlarged airspaces establish (initially) in relationship with respiratory bronchioles. Centriacinar emphysema is most prominent in the upper lobes and superior segments of lower lobes and is often quite focal. Panacinar emphysema refers to abnormally large airspaces evenly distributed within and across acinar units. Panacinar emphysema is usually observed in patients with α1AT deficiency, which has a predilection for the lower lobes. Distinctions between centriacinar and panacinar emphysema are interesting and may ultimately be shown to have different mechanisms of pathogenesis.

However, garden-variety smoking-related emphysema is usually mixed, particularly in advanced cases, and these pathologic classifications are not helpful in the care of patients with COPD.

1.6 Classification of COPD Severity

Stage	**Characteristics**
I	Mild COPD $FEV_1 \geq 80\%$ predicted
II	Moderate COPD $50\% \leq FEV_1 < 80\%$ predicted
III	Severe COPD $30\% \leq FEV_1 < 50\%$ predicted
IV	Very Severe COPD $FEV_1 < 30\%$ predicted

II. CLINICAL PRESENTATION

2.1 History

The three the major symptoms in COPD are cough, sputum production, and exertional dyspnea. Many patients of COPD these symptoms appear for months or years prior to seeking medical attention. while the development of airflow obstruction is a steady process, lots of patients date the commencement of their disease to an acute illness or exacerbation.

Additional worsening airflow obstruction is an augmented incidence of exacerbations. Patients may also develop resting hypoxemia and need institution of supplemental oxygen.

2.2 Physical Findings

- In the early stages of COPD, patients usually have an entirely normal physical examination. Current smokers may have signs of active smoking, including an odor of smoke or nicotine staining of fingernails. In patients with more severe disease, the physical examination is notable for a prolonged expiratory phase and expiratory wheezing.

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- In adding, signs of hyperinflation consist of a barrel chest and enlarged lung volumes with poor diaphragmatic excursion as assessed by percussion.
- Patients with severe airflow obstruction may also exhibit use of accessory muscles of respiration, sitting in the characteristic ―tripod‖ position to facilitate the actions of the sternocleido mastoid, scalene, and intercostal muscles.
- Patients may develop cyanosis, which is visible in the lips and nail beds.
- Signs of overt right heart failure, termed Cor pulmonale, are relatively infrequent while the advent of supplemental oxygen therapy.
- Clubbing of the digits is not a sign of COPD,

2.3 Exacerbations of COPD

A hallmark of COPD is the exacerbation of symptoms beyond normal day-to-day variation, often as well as increased dyspnea, an increased frequency or severity of cough, increased sputum volume or change in sputum character. These exacerbations are usually precipitated by infection (more often viral than bacterial) or ecological factors. Exacerbations of COPD vary widely in severity but classically need a change in regular therapy.

2.4 Laboratory Findings

- Spirometry provides objective information about pulmonary function and assesses the results of therapy.
- Pulmonary function tests early in the course of COPD reveal only evidence of abnormal closing volume and reduced mid expiratory flow rate. Decrease in FEV1 and in the ratio of forced expiratory volume to vital capacity (FEV1% or FEV1/FVC ratio) occur later on.
- Examination of the sputum may reveal Streptococcus pneumoniae, H influenzae, or Moraxella catarrhalis. Positive sputum cultures are poorly correlated with acute exacerbations, and research techniques demonstrate evidence of preceding viral infection in a majority of patients with exacerbations. The ECG may show sinus tachycardia and, in advanced disease, chronic pulmonary hypertension may produce electrocardiographic abnormalities typical of Cor pulmonale.

2.5 Imaging

- Radiographs of patients with chronic bronchitis show only nonspecific peribronchial and perivascular markings.
- CT of the chest, particularly using high resolution reconstruction algorithm is more sensitive and specific than plain radiographs for the diagnosis of emphysema. Pulmonary hypertension may be suggested by enlargement of central pulmonary arteries in advanced diseases.
- Doppler echocardiography provides a noninvasive estimate of pulmonary artery pressure if pulmonary hypertension is suspected.

Table 1: COPD and its differential diagnosis

Diagnosis	Suggestive features
COPD	Onset in mid life Symptoms slowly progressive History of smoking of cigarette or exposure to other types of smoke
Asthma	Onset early in life (often childhood) Symptom vary widely from day to day Symptoms worse at night/ early morning Allergy, rhinitis, and / or eczema also present Family history of asthma.
Congestive heart failure	Chest X-ray shows dilated heart, pulmonary oedema. PFT indicate volume restriction, not airflow limitation
Bronchiectasis	Large volumes of purulent sputum. Commonly associated with bacterial infection. In Chest X-ray/CT – shown dilation of bronchial, and thickening of bronchial wall)
Tuberculosis	Onset at younger age, non smokers. history of rheumatoid arthritis or acute fume exposure may present. Seen after lung or bone marrow transplantation CT on expiration shows hypodense areas.
Diffuse Pan bronchiolitis	Predominantly seen in patients of Asian descent. Most patients are male and nonsmokers. Almost all have chronic sinusitis. Chest X-ray and HRCT show diffuse small centrilobular nodular opacities and hyperinflation.

III. REVIEW OF COMMONLY USED HOMOEOPATHIC MEDICINES FOR COPD

The Homoeopathic medicines prescribed were given on the basis of totality of symptoms. Homoeopathic Materia Medica has a wide range of medicines which have the symptoms of COPD like dyspnoea and cough and there are few medicines which are specifically for bronchitis and emphysema. Following are few homoeopathic medicines for COPD

a) ***Alumina***-Dry, hacking cough soon following waking in the morning, difficult raising of a little white mucus; cough with tearing pains and involuntary urination in old or withered looking people; agg. in the cold season and lasting till the warm season sets in again, cough amel. by

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lying flat on the face; sputum difficult and of a putrid taste.

b) ***Antimonium arsenicosum***- It is best suited for preferably upper left lung. **Emphysema** where the Dyspnoea is excessive.It is equally effective in right side cases in old pneumonias and catarrhal pneumonias in children; in old pleuritic effusions, and in pericardial exudations. The cough is agg. by eating, and on lying down.

c) ***Antimonium tartaricum***-Catarrh, with irritation, which excites coughing, copious accumulation of mucus, and rattling of mucus in the chest. Dyspnoea, compelling one to sit up. Shortness of breathing from suppressed expectoration. Shortness of breath. Difficult respiration. Paralysis of the lungs. Rattling of mucus . Fitful pain, as from excoriation in the chest,

d) ***Arsenicum album*** **-Bronchitis**, with difficult secretion of mucus. Dry irritating cough, rarely deep, fatiguing, and shaking, generally in the evening after lying down on bed , or at night, obliging the patient to assume an erect posture; as well after drinking; on being in the fresh and cool air, during movement, or during expiration. Periodical attacks of cough. Cough with expectoration of sanguineous mucus, sometimes with burning heat over the whole body. The sufferings occur chiefly in the evening in bed, or at night, when lying down; also in windy weather, in the fresh and cold air, or in the heat of a room, or when warmly clothed, on being fatigued on being angry, on walking, on moving, and even on laughing. Respiration anxious, stertorous, and wheezing. Chilliness or coldness in the chest.

e) ***Arsenicum iodatum***- cough is slight hacking in nature, with dryness and stoppage of the nostrils. Asthmatic sensations; must sit up to breathe. Expectoration heavy night and morning. recurrent cough with mucopurulent discharge and sometimes stringy expectoration. Expectoration is greenish yellow pus like; haemorrhage (chronic induration of the lungs). **Chronic Bronchitis** with difficult expectoration and short breath. Pneumonias that fail to clear up.

f) ***Aspidosperma***-The digitalis of lungs. Removes temporary obstruction to the oxidation of the blood by stimulating respiratory centres, rising oxidation and excretion of carbonic acid. It stimulates the respiratory centres and increases the oxygen in the blood. Want of breath‘during exertion is the chief symptom. Cardiac asthma.

g) ***Blatta orientalis***-A remedy for asthma. Especially when associated with bronchitis. Indicated after arsenic when it is insufficient. Cough with dyspnoea in **bronchitis** and pthisis. Acts best in stout and corpulent patients. Much pus like mucus.

h) ***Bryonia***- when breathing or coughing stiching feeling in chest. Inclination to cough, as if from viscid mucus, afterwards pains, as of excoriation, in the larynx, provoked by speaking, or by smoking tobacco**.** Cough, mostly dry, excited by a tickling in the throat, or as if cause by smoke in the larynx.Cough with involuntary secretion of urine; hoarseness; thirst; sneezing; stitches in the chest and small of the back; red face; aggravated by motion, talking, laughing, eating, and drinking.[12]

i) ***Drosera***-Tingling in the larynx, which excites a slight cough, and shootings extending to the throat. Cough as soon as the head touches the pillow. Fatiguing cough like whooping cough with bluish face, wheezing respiration, attacks of suffocation, bleeding from the nose and mouth, and anxiety. Singing, tobacco smoking, and drinking, aggravate the symptoms of cough.

j) ***Grindelia robusta*** **–** Present of wheezing and oppression in patient of bronchitis. Asthma, with profuse tenacious expectoration, which relieves. breathing stop when falling asleep; wakes with a star, and gasps for breath. Must sit up to breathe. Bronchorrhoea, with tough, whitish, mucous expectoration. Sibilant rales. Weak heart and respiration. Cannot breathe lying down. Cheyne.Stokes respiration.

k) ***Hepar sulphur*** -Sneezes every time he goes into a cold, dry wind, with running from nose, later, thick, offensive discharge. Stopped up each time he goes out into cold atmosphere. Smell like old cheese. Hay fever. Cough aggravate whenever any part of the body gets cold or uncovered, or from eating anything cold. Croup with loose, rattling cough; worse in morning. Choking cough. Rattling, croaking cough; suffocative attacks; has to rise up and bend head backwards. Asthma worse in dry cold air; better in damp.Palpitation of heart.

l) ***Justicia adhatoda*** - cough was dry from sternal area all over chest. Hoarseness, larynx painful. Paroxysmal cough, with suffocative obstruction of respiration. Asthmatic attacks, cannot tolerate a close, warm room. Whooping cough.

m) ***Kalium bichromicum***- Cough caused by eating. At dinner, after first mouthful, great tickling in larynx; >> on eating more. Cough hoarse, metallic, with expectoration of tough mucus or fibrous elastic plugs (croup; membranous or croupous Bronchitis).Dry cough, with stitches in chest. Expectoration of sticky mucus, which can be drawn in strings to the feet.

n) Dry cough subsequent to dinner. Cough, with pain in loins, vertigo, dyspnoea, shootings in chest. Oppressed breathing, awakens at 2 a.m.; palpitation; orthopnoea, feeling of cold sensation and stiffness about heart, lower portions of lungs oppressed. ―Stuffing" cough.

o) ***Lobelia inflata***- Dyspnoea from constriction of chest; aggravate by any exertion. Sensation of pressure or weight in chest area, which is better by fast walking. Feeling as if heart would stop. Asthma; attacks, with extreme weakness, felt in pit of stomach and preceded by prickling all over. Cramp, ringing cough, short breath, catching at throat. **Senile Emphysema.**

p) ***Medorrhinum***- Incessant, dry, night cough. Asthma. Dyspnoea; cannot exhale. Cough; better lying on stomach.

q) ***Phosphorus***-Suitable to sub-acute and lingering cases in delicate, tall, slender, overgrown or phthisical subjects. With Phosphorus the cough is worse after meals,

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and a guiding symptom is soreness and rawness of the chest; the cough is also worse going into the open air (reverse of Bryonia)

r) ***Psorinum***-Especially adapted to the psoric constitution. In chronic cases when well selected remedies fail to relieve or permanently improve (in acute diseases, Sulphur.); when Sulphur seems indicated but fails to act. Dyspnoea< in open air, sitting up (Laur.); >> lying down and keeping arms stretched far apart; despondent, thinks he will die. Cough returns every winter. Cough after suppressed itch, or eczema; chronic, sputa green, yellow or salty mucus; pus like.

s) ***Pulsatilla***-Coryza; stoppage of right nostril, pressing pain at root of nose. Yellow mucus; abundant in morning. Bad smells, as of old catarrh. Nasal bones sore. Dry cough which is aggravated in evening and at night; must sit up in bed to get relief; and loose cough in the morning, with copious mucous expectoration. Urine emitted with cough. Expectoration bland, thick, bitter, greenish. Smothering sensation on lying down.

t) ***Rumex crispus***-Violent irritation to cough in larynx starts when eating. (Cough all day, >> lying down at night.) Hoarse, hacking cough 11 p.m. and 2 to 5 a.m.Cough aggravated from changing rooms. Cough initially caused by inhaling extremely cold air during winter, agg. lying down, esp. 11 p.m. Cough aggravated by change from cold to warm or warm to cold. Cough aggravated by lying left side; >> lying right; >> covering up mouth; >> wearing respirator.

u) ***Senega***- Hacking cough.Thorax feels too narrow. Cough often ends in a sneeze. Asthenic bronchitis of old person with chronic interstitial nephritis or **chronic emphysema.** Old asthmatics with congestive attacks. Exudations in Pleura. Voice unsteady, vocal cords partially paralyzed.

v) ***Spongia tosta***- Asthma, where everything is completely tight and dry, no loose rattling sound appearing in the breathing or cough. feeling of obstruction (as from a plug) in larynx, with impeded respiration. Dyspnoea>> by bending the body forward. Hollow, dry, barking or whistling cough, day and night, aggravate in evening, and occasionally with pain in larynx. Laryngeal cough.Wheezing, whistling, sawing, anxious breathing; agg. during inspiration and when lying down (with violent labouring of abdominal muscles). Awakens from sleep with suffocative sensation.

w) ***Sticta pulmonaria***- Fullness at root of nose. continuous need to blow nose, but no effect on account of dryness. Dry cough aggravated towards evening and night; can neither sleep nor lie down; dry, noisy; severe, dry, racking with splitting frontal headache. Cough after influenza; after measles; after whooping cough; barking; agg. night and morning.

x) ***Sulphur***-Fetid expectoration of a greenish yellow colour, like pus, and of a salt or sweetish taste, while coughing. Febrile cough.Cough in general with bloody expectoration; esp. with heat in chest; haemorrhage with the same sensation. Feels suffocated, wants doors and windows wide open.Asthma attacks every eight days; has rough, harsh hair; following swelling of haemorrhoids; alternating with fits of gout or psoriasis; from suppressed eruptions or discharges. Shootings in the chest or sternum, or extending to the back, or into the left side, agg. when coughing, lying on the back,

y) ***Tuberculinum bovinum*** -Persons who had inherited phthisis, who were debilitated and anaemic. Cough before, and during chill. Suffocation; worse in a warm room. Tubercular deposits in apices of lungs (left). Dry hacking cough before the eveningchill, and the hacking cough lasts sometimes during the chill, and sometimes during the fever, but he knows the chill is coming by the cough. The expectoration is thick, yellow, often yellowish green in catarrhal conditions.

z) ***Wyethia helenoides***-Dry, hacking cough, caused by tickling of the epiglottis. Burning sensation in the **bronchial tubes**. Tendency to get hoarse talking or singing; throat hot, dry. Dry Asthma.

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