

# COPD in Non-smoker Women with Biomass Fuel Exposure (Chulha) - A review Article

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## **Abstract:**

*Exposure to indoor air pollution due to incomplete combustion of biomass fuel remains significant risk factor for chronic bronchitis and chronic obstructive pulmonary disease (COPD). In developing countries like India, especially in rural areas combustion of biomass fuel is the most important source of air pollution. This article aims to increase awareness regarding biomass exposure and respiratory morbidity in women.*

**Keywords: Biomass fuel, COPD, women**

## **Introduction:**

Chronic obstructive pulmonary disease is a combination of chronic bronchitis (mucus build up) and emphysema (lung damage). It is significant cause of global morbidity and mortality. In 2002, it was the 6th leading cause of morbidity and 4th leading cause of death. It is projected that by 2020 COPD will be the 5th leading cause of disability and 3rd leading cause of death worldwide<sup>1</sup>. Over the past five to seven years many studies suggested that risk factors other than smoking are also associated with COPD, such as air pollution, infection in childhood, occupational exposure to dust and fumes, history of pulmonary tuberculosis, chronic asthma, intrauterine growth retardation, poor nutrition and socio-economic state.

Exposure to indoor air pollution due to combustion of biomass fuels remains one of the significant risk factor of COPD. Rural women in developing countries bear the largest share of this burden resulting from chronic exposure to biomass fuel smoke. It is estimated that average women in India may be subjected to 60,000 hours of exposure to smoke due to combustion of biomass fuels in her lifetime.

## **Indoor air pollution**

Indoor air pollution is related to the combustion of biomass fuels which are chiefly derived from the use of wood, grass, vegetable matter, animal dung and charcoal. It is not sufficiently realised that worldwide about 50% of all households and 90% of rural households use biomass fuel as chief source of domestic energy, chiefly for cooking and heating. 3 billion people are exposed to smoke from incomplete combustion of biomass fuel compared to 1.01 billion to tobacco smoke globally. More than 80% of household of China, India and sub-saharan Africa use this fuel for cooking and 30 to 75% of homes in South America<sup>2</sup>. The smoke arising from burning of biomass fuel is heavily

polluted with particulate matter (<10µm- PM10), nitrogen dioxide, sulfur dioxide, carbon monoxide, formaldehyde and polycyclic organic compounds including carcinogens. Using this fuel in small rooms with little or no ventilation is added risk to severe airway obstruction. Severe COPD with cor pulmonale and right heart failure is observed comparatively at a very young age in these women, in contrast to cor pulmonale due to tobacco smoke.

## **Why do more women get COPD than men?**

Women are more vulnerable to lung damage due to their small lungs and airways and less strong respiratory muscles to move air in and out. Biomass fuel smoke and other pollutants are more highly concentrated in the smaller space, increasing the potential for damage. The female sex hormone estrogen also plays a role in worsening lung damage by increasing the rate of nicotine breakdown in the body<sup>3</sup>. Added rise in COPD in females due to working in tobacco industries. Exposure to biomass smoke is thought to increase the risk of COPD two to three fold<sup>4</sup>

## **History and clinical assessment:**

- ❖ Cases of chronic bronchitis in women can be identified on the basis of positive response to the questions “ Do you cough for at least three months in a year for at least two consecutive years?” according to the definition of Medical Research Council, UK (MRC)<sup>5</sup>.
- ❖ History of using wooden stove or chulhas should be asked to female. If yes, hours per day and years of exposure should be asked.
- ❖ History of passive exposure to passive environmental tobacco smoke and occupational exposure to dust with duration of exposure should be asked.
- ❖ Biomass Index calculation should be done.

Clinically women with COPD experience more frequent flare-ups, or sudden worsening of symptoms and each flare-up accelerates the progressive loss of breathing ability. Women suffer more chronic bronchitis whereas smoker men tend to develop more emphysema.

As women are vulnerable to COPD at younger age, their quality of life is impaired significantly longer than men. More severe shortness of breath, associated anxiety contributes to frequent emergency visits and more relapses which hasten the progress of disease. Women are less likely to be correctly diagnosed and hence less likely to be offered appropriate diagnostic tests for COPD.

### **Biomass Exposure Index:**

**It is a simple clinically applicable tool.**

Biomass Exposure Index = Average hours spend on cooking per day × Number of years of cooking.

This formula was developed by Behera ET al<sup>6</sup>.

This index 60 and above is considered high risk for developing COPD<sup>7</sup>.

Studies have shown that strength of association of biomass fuel exposure and COPD was similar to that of cigarette smoking<sup>8</sup>.

### **Conclusion:**

There is a need to increase more awareness for the use of modified cooking stoves that reduces indoor air pollution including the cost effectiveness to develop preventive strategies, well ventilated kitchen.

High suspicious index required for diagnosis of COPD in such women to give proper treatment, pulmonary rehabilitation and modification of their cooking lifestyle

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