

## ORIGINAL ARTICLE

# Association between biomass fuel exposure and respiratory diseases in a tertiary health care hospital, Bareilly: A cross sectional study

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**Background:** Half portion of the total population depends on biomass fuel as the essential wellspring of homegrown energy. Biomass fuel exposure causes a serious level of horribleness and mortality in people. This is particularly obvious with regards to agricultural nations, which represent almost 100% of the world's biomass fuel use. Biomass fuel comprises of kindling, waste cakes, rural yield deposits such as straw, grass, and bushes, coal powers and lamp oil. Together, they supply three fourth of the homegrown energy in India. Exposure to biomass fills has been found to be related with numerous respiratory illnesses, for example, intense lower respiratory diseases, constant obstructive pneumonic illness, cellular breakdown in the lungs, aspiratory tuberculosis, asthma, and lung cancers. Biomass. **Aims and objectives:** To study the association between biomass fuel exposure and respiratory diseases. **Materials and Methods:** The study was conducted among all patients diagnosed to have respiratory illness along with exposure to biomass fuel for more than 1 year attending the Department of Respiratory Medicine, Rohilkhand medical college and hospital, Bareilly, Uttar Pradesh from November 2019 to October 2020. **Results:** there is major association of biomass fuel exposure with chronic obstructive pulmonary disease followed by cancer. Tuberculosis is less likely associated with exposure to biomass fuels. **Conclusions:** Smoke from indoor strong fuel ignition for cooking or warming intentions is related with numerous intense and constant respiratory conditions. Albeit indoor strong fuel smoke is logical a more prominent issue in non-industrial nations, wood consuming populaces in created nations may likewise be in danger for these conditions, particularly when these openings are joined with cigarette smoking. Strategic planning and management is required.

**KEY WORDS:** Biomass fuel, chronic obstructive pulmonary disease, respiratory tract infections and lung cancer

## INTRODUCTION

One portion of the total populace depends on biomass fuel as the essential wellspring of homegrown energy.<sup>[1]</sup> Biomass fuel

causes a serious level of grimness and mortality in people. This is particularly evident with regards to non-industrial nations, which represent close to 100% of the world's biomass fuel use.<sup>[2]</sup> There are four head classes of indoor air contamination - ignition items, synthetic compounds, radon, and organic items. This article centers around the respiratory well-being impacts of contaminations from ignition of different kinds of indoor fills, which is right now a significant general medical issue on the planet.

Indoor energizes incorporate strong, fluid and gas powers. Strong energizes incorporate biomass and coal. Biomass fuel alludes to any living or as of late living plant or potentially creature based

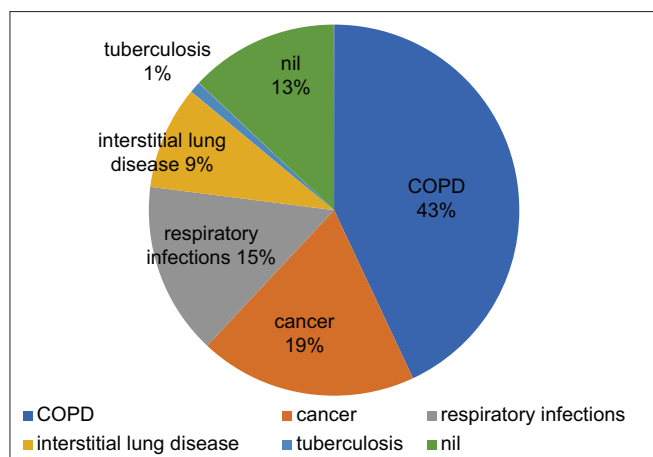
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material, that is, purposely singed by people as fuel such as wood, twigs, dried creature compost (e.g., cow waste), charcoal (a result of deficient consuming of wood), grass, or rural harvest deposits (e.g., corn husk, straw, and bagasse - biomass staying subsequent to handling sugar-stick). Coal, as particular from charcoal, is a normally happening non-renewable energy source shaped from safeguarded packed and to some degree transformed natural material. Coal incorporates “smoky” coal (bituminous coal) and “smokeless” coal (anthracite coal). Fluid fuel incorporates lamp oil and condensed oil gas (LPG). Gas powers incorporate methane and flammable gas. LPG and gaseous petrol, notwithstanding power, are generally seen as perfect fills.

Indoor air contamination from strong fuel use is firmly connected with untimely mortality just as chronic obstructive pulmonary disease (COPD) (both emphysema and ongoing bronchitis), intense respiratory plot contaminations, and cellular breakdown in the lungs and pitifully connected with asthma, tuberculosis, interstitial lung illness and cancers. More than one-half of the world’s households practices biomass fuels and a significant percentage of this activity taking places in conditions where much of the emission was released inside indoor living area.<sup>[3]</sup> This is more commonly seen in cold weathers and hilly territories where cold temperatures force a heavy contact in poorly ventilated dwellings. Women, doing most of the cooking for households in rural villages, were the most affected. Biomass fuels are one of the major cause of COPD.<sup>[4]</sup>

Worldwide, just about 2 million passings each year are owing to strong fuel use, with over almost 100% of these happening in agricultural nations.<sup>[1]</sup> The quantity of handicap changed life years (DALYs) owing to indoor air contamination from strong fuel for all uses is determined to be 40 million. India’s Figure 1 are exceptionally disturbing. With a yearly loss of life of 662,000 credited to biomass fuel openness, India best the rundown of fuel-related passings in the South Asian district.<sup>[2]</sup> Biomass fuel credits for 5–6% of the public weight of sickness.<sup>[5]</sup>



**Figure 1:** Distribution of respiratory diseases associated with biomass fuel exposure in a tertiary health care hospital, Bareilly

## Aim and Objectives

### Aim

The aim of the study is to find the association between biomass fuel exposure and respiratory diseases.

### Objectives

1. To know the distribution of respiratory diseases associated with biomass fuel exposure in a tertiary health care hospital, Bareilly.

The chances for creating COPD with biomass fuel openness is around a few crease higher, disproportionately influencing ladies and youthful grown-ups. In one accomplice of Colombian ladies, the populace inferable danger for wood smoke causing COPD was half.<sup>[6]</sup>

Exposure reaction examinations show a positive pattern, with connection between creating COPD and expanding level or span of exposure to biomass smoke.<sup>[6-11]</sup>

A Chinese review accomplice concentrate on found critical decrease in frequency of specialist analyzed COPD in homes where coal was utilized in further developed cooking ovens with stacks, the impact expanding with time since reception.<sup>[12]</sup>

While strong fuel uncovered ladies obviously are at higher danger for creating COPD in agricultural nations, uncovered men might be at higher danger in created nations.<sup>[13]</sup> There is conceivably no sex preference towards these results. The higher weight of infection in a specific sexual orientation in a locale probably mirrors the sex-related contrasts in exercises that lead to more noteworthy openness.

Openness to biomass smoke since the beginning might impede lung development. Different files of lung work were lower among juvenile and youthful grown-up people in Nepal (16–25 years of age) who were biomass smoke uncovered, contrasted with the individuals who were not.<sup>[14]</sup>

Acute respiratory tract infections can be isolated into two sorts - upper respiratory tract infections (AURI) and lower respiratory tract infections (ALRI) of which ALRI is related with a more serious danger for death. Babies and kids residing in homes utilizing strong fills are at expanded danger for creating both AURI and ALRI and biting the dust from ALRIs.<sup>[15]</sup>

Albeit smoking is the significant danger factor for cellular breakdown in the lungs around the world, roughly 1.5% of yearly cellular breakdown in the lungs passings are ascribed to openness to cancer-causing agents from indoor strong fuel utilize.<sup>[16]</sup> The International Agency for Research on Cancer (IARC) has characterized burning items from coal and biomass powers as Gathering 1 and 2A cancer-causing agents individually (for example known and likely cancer-causing agents separately).<sup>[17]</sup> Predictable with the IARC arrangement, the information recommends a more grounded relationship

for coal smoke with cellular breakdown in the lungs, when contrasted with openness to other biomass fuel smoke, in the two creatures and people.<sup>[1,18]</sup>

There is conflicting proof that openness to biomass smoke builds the danger of either obtaining tuberculosis or movement of tuberculosis to clinical infection. exposure to wood smoke brings about impeded macrophage phagocytic capacity and surface adherence; diminished mucociliary freedom; and decreased bacterial leeway.<sup>[15,19,20]</sup> These components might incline presented subjects to tuberculosis.<sup>[21,22]</sup>

Exposure to strong fuel smoke might improve illness seriousness among asthmatics. In a little partner investigation of kids in a lodging of a metropolitan school in New Zealand, top degrees of air contamination from wood consuming were related with little, however, genuinely huge impacts on forced expiratory volume in 1 s (FEV1) diurnal inconstancy, morning upsides of FEV1, and evening time top expiratory stream rate esteems in the (specialist analyzed) asthmatic understudies.<sup>[23]</sup>

Hovel lung, an interstitial lung infection portrayed through carbon testimony, dust macules, and blended residue fibrosis, has been accounted for in the event that series principally of ladies with persistent undeniable level openness to indoor biomass smoke in agricultural nations.<sup>[24,25]</sup>

There may likewise be respiratory impacts related with the indoor ignition of kerosene oil, a typical cooking fuel in many areas of the planet, for which outflows and openings are halfway between those for strong and for vaporous fills (Smith 1987), however on which not many investigations of well-being impacts appear to have been directed. In one such review, indoor kerosene oil ovens were related with low lung work in a cross-sectional assessment of 7–12 year old Malaysian kids.<sup>[26]</sup> In another cross-sectional investigation of Indian ladies, kerosene oil clients had less side effects than biomass fuel clients (13% vs. 23%) yet more than LPG clients (8%) 44. A comparable pattern was noted for lung work in that study.<sup>[27]</sup>

## MATERIALS AND METHODS

### Study Design

A case control study was carried out in Rohilkhand medical college and hospital, Bareilly.

### Study Group

Adults aged 18–65 years having respiratory illness along with exposure to biomass fuel were considered as cases.

### Study Area

It was conducted as a prospective study in the Department of Respiratory Medicine in Rohilkhand Medical College & Hospital, Bareilly.

### Study Duration

Study was conducted from January 2021 to April 2021.

### Inclusion Criteria for Case

- 1) Age between 18 and 65 years.
- 2) Diagnosed to have respiratory illness along with exposure to biomass fuel for more than 1 year.

### Exclusion Criteria

1. Patients who were not willing to participate in the study.
2. Exposure to biomass fuel for <1 year.
3. Presence of any known systemic illness, autoimmune diseases, allergy or cancer.

### Source of Cases

The source of the cases was Rohilkhand medical college and hospital, Bareilly.

### Ethical Clearance

Approval was taken from the Institutional Ethics Committee, Rohilkhand medical college and hospital, Bareilly for conduction the study. Informed written consent was taken from the cases.

Sample size:  $n = (Z1 - \alpha/2)2 P(1-P)/d2 = 46.62 \sim 47$ <sup>[28]</sup>

### Methodology

Detailed history, physical examination (general and systemic) and relevant investigation was done as and when required. Past medical history, history of exacerbation/hospitalization was identified and reported. History of any exposure, for example., smoking, biomass fuel exposure etc was elicited along with its duration of exposure or use. Radiological investigations including Chest X Ray and High Resolution Computed Tomography were done and pattern of the disease was identified. Spirometric analysis of the patients was done using computerized spirometer MIR Spirolab 3 with flow transducer. Sputum smear examination for Acid fast Bacilli, culture, CBNAAT was done. Blood investigations included routine investigations and certain disease specific tests were done as and when required. Bronchoscopy was performed on specific patients and BAL was investigated accordingly. All the data was recorded in a preformed case record form and analysed at the end of the study.

### Statistical Analysis

The data were coded and entered. Its clearing and compiling was done on a Microsoft excel spread sheet and then it was imported into Statistical Package for Social Sciences version 23.0 for statistical analysis. Data were analysed by applying frequency, percentage, mean, standard deviation.

Appropriate statistical tests was applied based on distribution and type of data. The quantitative data, expressed in means was analyzed by *t*-test and proportions through chi square test.

A  $P < 0.05$  was considered statistically significant.

## RESULTS

In my case subjects there is major association of biomass fuel exposure with COPD (43%) followed by cancer (19%). Tuberculosis is less likely associated with exposure to biomass fuels.

## DISCUSSION

The diseases associated with biomass fuel exposure were COPD, cancers, respiratory tract infections, interstitial lung diseases. Tuberculosis or asthma are less likely associated with biomass fuel exposure, however, asthmaticus exacerbations have association with the exposure. Furthermore, sometimes there is no occurrence of lung disease even after chronic exposure to biomass fuels.

Smoking has a strong association with COPD in my study. Females are more prone to lung diseases associated with biomass fuel exposure in my study maybe due to chronic exposure while cooking with biomass fuels (woods, coals, cowdung, cakes etc). Unemployed, illiterate, hindus, rural, socio-economic class 5 population are significantly exposed to lung diseases with chronic use of biomass fuel.

### Limitations of the Study

It is difficult to generalize the result as sample size is low and also because, it is a single centered study of shorter duration. The absence of real exposure estimations, deficient result appraisal adds to misclassification predisposition. Lacking comprehension of the unthinking bases for these affiliations and of the job of hereditary qualities and epigenetics in influencing individual weakness are extra constraints of this field. Solid fuel smoke as a danger factor for COPD and cellular breakdown in the lungs is not all around portrayed in created countries. Studies of little example size frequently have inadequate measurable ability to uncover conceivable circumstances and logical results relationships. Inadequate result appraisal adds to misclassification predisposition.

## CONCLUSION

Smoke from indoor strong fuel ignition for cooking or warming intentions is related with numerous intense and constant respiratory conditions. Albeit indoor strong fuel smoke is logical a more prominent issue in non-industrial nations, wood consuming populaces in created nations may likewise be in danger for these conditions, particularly when these openings are joined with cigarette smoking. Studies propose that lower strong fuel smoke openness might be related with lower hazard for select respiratory results. It is at present muddled if anticipation of persistent sickness can be accomplished by diminishing strong fuel openness and how much decrease in openness is needed to accomplish a helpful advantage. Increment mindfulness about the well-being impacts of strong fuel smoke inward breath among doctors and patients and advance preventive drives through instruction, exploration, and strategy change.

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