Summary

The present thesis has been summarized as per chapter wise distribution such as introduction, historical account, materials and methods, observations, discussion, summary and in the last conclusion and references.

Chapter – 1: Introduction

The use of biomass fuel for cooking and heating is common in developing countries. Rural areas around Meerut use biomass fuel as the primary cooking fuel in 80% of households. Biomass smoke contains hundreds of chemical compounds, like carbon dioxide, particulates, benzopyrene, formaldehyde etc. These components are present in crop residue and cow and buffalo dung cake. Smoke emitted include particles, polycyclic aromatic hydrocarbons and carbon monoxide. Exposure to biomass smoke has an important global impact on mortality and morbidity. Indoor air pollution caused by chronic bronchitis, chronic obstructive pulmonary disease, cataract, and blood related disease in people.

Indoor air pollution is a major public health problem in developing countries. Present study refers to rural integrated women health in villages. The aim of this study was to find out association with pollution and health and between social factors viz. age, sex, rural area and income etc. Indoor air pollution from biomass fuels have been implicated as for tuberculosis infection,
anemia, cataract, cancer and other diseases and death. Persistent indoor air pollution exposures in these regions cause tuberculosis as a major health risk. We undertook a systematic study to assess the association between these exposure and the risk of infection, disease and death. Biomass fuel combustion increase tuberculosis, cancer, cataract, anemia, liver dis-function, kidney disorder, blood related disease and cough. The present investigation findings show that biomass fuel smoke is associated with an increased risk of tuberculosis infection, decrease immunity of the body, cough disease and anemia. In the present study we found much more variation in haematological, biochemical and immunological parameters in the rural women which use biomass fuel.

Chapter 2: Historical Account

Details of historical account have been given in chapter no. 2 regarding various aspects of the present thesis.

Chapter 3: Materials and Methods

The present study was undertaken to know the immune responses and modulation in various haematological, biochemical and immunological parameters occurring in women.

The details of materials and methods have been given in chapter no. 3 of the present thesis.
Chapter 4: Observations

Haematological study

Haemoglobin, total RBC and packed cell volume values decrease significantly in users women resulting in hypoxic secondary polycythaemia i.e. mild secondary types associated with erythrocytosis which is a comparisatory mechanism in this case as seen in poor oxygenation and pulmonary arteriosclerosis.

The total leucocyte counts decrease significantly in biomass user women. The decrease in TLC count is due to inhalatory toxic gases present in biomass smoke which cause pulmonary mechanism and leads to migration of white blood cells to site of tissue injury resulting leucopenia. The red cell indices MCV and MCHC increase and decrease significantly in biomass user women. A variation in these values of red cell indices is directly co-related with decrease and increase in total RBC, haemoglobin concentration and PCV values causing secondary hypoxic polycythaemia in women.

Significant elevations are found in the neutrophils, eosinophils and monocytes in biomass user women.

Biochemical study

The serum total protein decrease significantly in biomass user women. The decrease in serum total protein is due to the respiratory inflammation accompanied with epithelial cell injury by biomass fuel exposure causing
leakage of protein from serum to the site of pulmonary injury leading to
decrease in serum total protein in women.

Serum albumin decrease non-significantly after biomass smoke
exposure. This may be correlated with pulmonary injury in women due to
inhalation of biomass fuel smoke. The serum total globulin increase
significantly in biomass user women.

The serum alkaline and acid phosphatase increase significantly in
biomass user women except in 41-50 years age groups. In this group the
alkaline phosphatase was slightly decreased. These value are correlated with
hypoxic in biomass user women. The increase serum alkaline phosphatase
activity is attributed to damaging effect of biomass smoke exposure on biliary
lining causing damage to liver cells resulting in impaired liver function in
women. The serum glutamate transaminase increase non-significantly and
serum glutamate pyruvate transaminase increase significantly in biomass fuel
user women. An increase in SGOT and SGPT in the indication of biomass fuel
smoke damage to hepatocytic membrane causing impaired liver function and an
increase is also co-related with decrease in serum total protein in women.

The serum total bilirubin increase significantly in two groups (15-30
years and 51-60 years age). This value may be correlated with pulmonary
injury in women due to inhalation of biomass smoke exposure.
The blood glucose increase significantly in biomass fuel user women. An increase blood glucose level is due to the inhalation of biomass smoke which causes tissue injury and stress condition which stimulate hyperglycaemia in women.

*Immunological study*

Present study revealed significant elevation in the level of IgE, IgM, IgG and IgA antibodies showing allergic response in biomass user women.
Significant Findings

1. Present observation points out that the use of biomass fuel for cooking is most common in villages approximately 90% rural population in India.

2. Poor socio-economic status with poor education are associated with poor knowledge of effects of indoor air pollution, inadequate and delayed availability of health care. Poverty also results in poor nutrition and low body weight which also affect the immune system of women.

3. Present observation shows weakness and cough problems which are mostly associated with low income rural people group.

4. Pulmonary tuberculosis showed high prevalence in villages. Population suffering from pulmonary tuberculosis had a significant association with income, age and habitat.

5. The present investigation reveals a very interesting feature that these women which used biomass fuels show restlessness. This fact confirms that women having RBCs with reduced surface area/volume ratio coupled with reduction in RBCs number remain in a very disadvantageous condition in respect to respiratory efficiency.
6. The observed haematological manifestations in women due to indoor air pollution are suggestive of pernicious and macrocytic anemia as a result of vitamin deficiency.

7. Important aspect has emerged from the present study that indoor air pollution induced hypersensitivity section to haematological, biochemical and immunological parameters probably due to toxic effects of biomass smoke which produce toxic effects on biological system.

8. The elevation in biochemical constituent show disturbed carbohydrate, proteins, fats and amino acid metabolism. These are the main source of energy.


10. A highly significant decrease in platelet count in biomass exposure women.

11. A significant decrease in total RBC count, haemoglobin, and PCV values in biomass smoke exposure women.

12. A significant decrease in WBC count and platelets count in women.

13. A significant decrease in serum protein and albumin in women due to indoor air pollution.

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15. A significant increase in immunoglobulin IgM, IgG, IgA and IgE in women.

Biomass fuel smoke pollution is a major public health hazard for a large number of the world’s poorest, most vulnerable people and may be responsible for the global burden of disease. The greatest contribution to this burden results from women, due to acute lower respiratory tract infections. It is important to extend and strengthen particularly for most common and serious conditions including lower respiratory tract infections, tuberculosis, asthma, fever and chronic respiratory disease to quantify exposure.

The present study reveals that inflammatory actions due to indoor air pollution particularly on haemopoietic system cause thrombocytopenia, hypoxic polycythemia and leucopenia in women and disturb the metabolic activity by significant alternation of serum and values which is an indication of extensive pulmonary injury and impaired liver function.