Biomass fuel and cataract: An unrecognized epidemic

Dear Editor:

Exposure to indoor air pollution, including biomass fuel (BMF), that is, wood, charcoal, animal dung, and crop waste poses a significant health hazard, especially to women and children in developing world.[1] It is associated with increased incidence of respiratory infections including pneumonia, tuberculosis, chronic obstructive lung disease, low birth weight, perinatal mortality, cataract, cardiovascular events, and all-cause mortality in adults and children.[1] A systematic review of literature of environmental tobacco smoke (ETS) and eye diseases in 2008 revealed that there is very scarce data in literature to establish a very conclusive relationship between ETS and eye diseases and expressed the need to include ETS in future studies.[2]

One of the ocular risk factor reported with use of BMF is cataract formation. Cataract is the leading cause of blindness and second leading cause of visual impairment (VI) globally and the burden of cataract is higher in developing countries and is more common in females.[3] Though various environmental risk factors have been studied for cataract, including exposure to ultraviolet (UV) radiation and smoking, a little is studied about the association of BMF and cataract.

Use of BMF becomes important public health problem for the reason that 50% of world population (including 90% of rural household in developing countries) is dependent on use of BMF and BMF also accounts for 76% of global particulate matter.[4] The data from past decade is limited and is available from only India, Nepal, and Bangladesh and this data is mainly from cross-sectional and case-control studies.[5-7] Cross-sectional study done from Western part of India[5] looked at data of 469 subjects with nearly 60% of subjects less than 40 years of age. The use of wood and cattle dung was classified as BMF, whereas use of coal, kerosene, and liquefied petroleum gas (LPG) was treated as separate group. Use of wood alone was at increased risk of cataract formation (odds ratio: 2.12; 95% CI, 1.03–4.34), however use of BMF alone was not associated with cataract formation (odds ratio: 1.87; 95% CI, 0.95–3.67). However, the study was limited due to small sample size as well as some uncontrolled confounding, mainly UV light exposure and antioxidants which were not controlled. Another cross-sectional study from India found association of BMF with cataract for women, but not for men.[6] Similarly, the study from Nepal[7] was a case-control design and enrolled 200 cases and 200 control and found that compared with clean burning-fuel stove, the adjusted odds ratio (OR) for using fueled stove was 1.23 (95% CI, 0.44–3.42), whereas use of unfueled solid-fuel stove had an OR of 1.90 (95% CI, 1.00–3.61). Though the authors had adjusted for many of the known confounders, they accepted that there can be some residual unmeasured confounding and role of chance and warranted further studies to prove the hypothesis. They also did not deny that the small sample size would be another limitation of the study. Similarly, a recent study from Bangladesh[8] found positive association between use of rice straw (OR: 1.95; 95% CI, 1.03–3.69) and found an inverse association between use of cow dung (OR: 0.45; 95% CI, 0.24–0.84) for which there was no plausible explanation. Possible suggestions include to identify the difference in smoke constituents which can

cause the difference or it can be result of some uncontrolled confounding.

However, the major limitations with these studies were that the data was not collected longitudinally which precludes establishment of definitive causal relationship and none of these studies have looked at the association of BMF with different morphology of cataract. However, as results from all the studies have shown some association of use of BMF and cataract, it is difficult to ignore the fact and more studies are needed to validate the data. As a randomized controlled trial for such exposures is not possible, data from longitudinal observational studies as well as other observational studies from other parts of developing world would be needed and if these studies produce consistent result and appear to be free of major biases, they can produce useful information that justifies public health action. There is also a need for development of good exposure assessment tools and biomarkers for assessment of BMF which will aid in epidemiological studies to look for causality.

If this evidence is established with some more studies, it will have huge policy implications. With 50% of the global population using BMF, even a small association can translate to huge population attributable risk (PAR) and subsequently, the goal of intervention would be to reduce exposure to indoor air pollution. However, the challenge would be, at the same time, meeting the domestic energy and cultural needs of the community.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Rohit C Khanna[1,2,3,4]

[1]Allen Foster Community Eye Health Research Centre, Gullapalli Pratibha Rao International Centre for Advancement of Rural Eyecare, [2]Brien Holden Eye Research Centre, LV Prasad Eye Institute, Hyderabad, Telangana, India, [3]School of Optometry and Vision Science, University of New South Wales, Sydney, Australia, [4]University of Rochester, School of Medicine and Dentistry, Rochester, NY, USA

Correspondence to: Dr. Rohit C Khanna, L V Prasad Eye Institute, L V Prasad Marg, Banjara Hills, Hyderabad - 500 034, Telangana, India.
E-mail: rohit@lvpei.org

References

1. Fullerton DG, Bruce N, Gordon SB. Indoor air pollution from biomass fuel smoke is a major health concern in the developing world. Trans R Soc Trop Med Hyg 2008;102:843-51.
2. Lois N, Abdelkader E, Reglitz K, Garden C, Ayres JG. Environmental tobacco smoke exposure and eye disease. Br J Ophthalmol 2008;92:1304-10.
3. Flaxman SR, Bourne RR, Resnikoff S, Ackland P, Braithwaite T, Cicinelli MV, *et al*. Global causes of blindness and distance vision impairment 1990-2020: A systematic review and meta-analysis. Lancet Glob Health 2017;5:e1221-34.
4. Bruce N, Perez-Padilla R, Albalak R. Indoor air pollution in developing countries: A major environmental and public health challenge. Bull World Health Organ 2000;78:1078-92.
5. Saha A, Kulkarni PK, Shah A, Patel M, Saiyed HN. Ocular morbidity and fuel use: An experience from India. Occup Environ Med 2005;62:66-9.
6. Ravilla TD, Gupta S, Ravindran RD, Vashist P, Krishnan T, Maraini G, *et al*. 2016. Use of cooking fuels and cataract in a population-based study: The India Eye Disease Study. Environ Health Perspect 124:1857-62.
7. Pokhrel AK, Smith KR, Khalakdina A, Deuja A, Bates MN. Case-control study of indoor cooking smoke exposure and cataract in Nepal and India. Int J Epidemiol 2005;34:702-8.
8. Tanchangya J, Geater AF. Use of traditional cooking fuels and the risk of young adult cataract in rural Bangladesh: A hospital-based case-control study. BMC Ophthalmol 2011;11:16.

Access this article online

Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_159_20

Cite this article as: Khanna RC. Biomass fuel and cataract: An unrecognized epidemic. Indian J Ophthalmol 2020;68:1500-1.