Cover Letter

Dear Professor,

I am Dr. Shashi N. Kumar with expertise in areas including **Toxicology, Cell biology & Electron Microscopy**. Recently, I have been awarded PhD degree entitled '**Study of Toxic Manifestations of Exposure to Pesticides in Workers in Tea Gardens in North Eastern State of India**' by **ICMR-National Institute of Pathology**, **Jamia Hamdard.**

During my PhD, I worked on pesticides exposure on female tea garden workers. Since,women and children have generally been recognized as efficient pluckers and the most beneficial labor force in the tea gardens. Spraying of pesticides is handled by men, whereas the collection of tea leaves is done by women workers. This arrangement directly exposes both men and women to the pesticides used.

Exposure of pesticides in tea garden workers were studied by **HPLC and GC/MS techniques**. In results, female tea garden workers (TGW) were directly exposed to pesticides during pregnancy. Pesticides such as heptachlor, endosulfan sulfate, phosalone and imidacloprid etc., cross through the placenta, enter the fetal blood and accumulate in the body compartment of the fetus, subsequently causing adverse health effects. In addition, some pesticides accumulate in the placenta and cause potential alterations in the development or functions of placental structures resulting in adverse effects on foetal development.

In **Transmission Electron Microscope (TEM)**, most of the placental tissues of TGW exposed to pesticides showed increased heterochromatin content and nuclear aggregation in trophoblasts (especially syncytial trophoblasts). **Scanning Electron Microscope (SEM),** revealed micro-infarction, increased deposition of fibrinoid material in the placental tissue of TGW exposed to pesticides along with other atypical characteristics of villi such as mushroom-like structure.

In this study, I determined the expression of apoptosis markers in placental tissue exposed to pesticides by **IHC, WB and TUNEL assay**. An apoptosis marker, BCL-2 protein was abundantly immunolocalized in syncytiotrophoblasts of normal birth weight babies (NBW) group, while, least abundant in LBW placenta exposed to pesticides. M30 cytoDeath & BAX was over-expressed in LBW placental exposed pesticides in TGW. Apoptotic nuclei were more frequently evidenced in LBW placentas of TGW exposed to pesticides.

Further, I explored the **oxidative markers** in peripheral blood, cord blood and placental tissues exposed to pesticides in tea garden workers. As result, it was observed that **4-HNE** (lipid peroxidation marker), **8-OHdG** (oxidative DNA damage markers) and **HIF-1α** were abundantly immunolocalized in syncytiotrophoblasts of placentas in TGW exposed to pesticides, while, least abundant in placentas of the non-exposed group.

As my dissertation confirmed the **'causal effect'** relationship between prenatal exposure to pesticides and the reproductive health of women working in tea plantations.

These findings suggest that **pesticides cause pathological changes and increase hypoxia in the placenta, thereby providing molecular insight into human placental pathologies.** This study also suggests that there is a need **for awareness about the potential hazards of occupational exposure to pesticides and the benefits of protective equipment for TGWs**.

I have published four research papers in esteemed journals with high impact factors from my PhD work. In addition, another manuscript is communicated as my first author paper. Also, I had been awarded the best oral presentation award and a young scientist award for my research in electron microscopy. During my PhD, I have ***gain expertise in microscopy (SEM, Light microscope & confocal microscopy) and transmission electron microscopy (TEM)*** techniques allowing super-resolution imaging (sample preparation , section cutting -semithin and ultrathin). I used these tools to study the placental structure.

After working for more than 6 to 7 years as a research scholar, I have acquired the expertise in **Bio analytical technique (Quantification of pollutants by HPLC, GC/MS; extraction of organic pollutant from urine, blood & placental tissues) , Immunohistochemistry, Oxidative stress parameters in blood and tissues, apoptotic technique, histopathological technique, oxidative DNA damage and western blotting technique**.

During the course of my PhD programme, I worked Senior Research Fellow. I executed numbers of projects in the domain as are mentioned in my resume. I'm having an enormous amount of experience and research in the domain of environmental toxicology, electron microscopy and cell biology. Therefore, my area of research interest is related to Electron Microscopy, Cell Biology and Environmental Toxicology.

As a postgraduate student, I began my research on pathological changes in combined toxicity of the pesticides endosulfan and ochratoxin- A (OTA) in adult male Wistar rats at Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India. This study was designed to address the concern that in real life, organisms are concurrently exposed to several i.e., more than one pollutant or toxin. Therefore, from this study, I had drawn the following conclusions that low doses of OTA @ 4 mg/kg BW and endosulfan @ 5 mg/kg BW either alone or combined for 30 days caused significant toxicity in adult rats. The results suggest that **both toxins (OTA and endosulfan) had additive effects in rats.**

I attained expertise **in animal handling, isolation of brain by cervical dislocation, isolation of internal organs (bone marrow aspiration liver, colon, heart, testis, spleen kidney etc.) in wistar rat and swiss albino mice and genotoxic technique**. **I published various research papers in esteemed journals from my MSc work.**
I have self-sufficient, excellent communication, writing and data interpretation skills. I have the ability to work independently and independent scientific research investigations. I have attached my resume for additional details regarding my skills and research experience.
Please do not hesitate to reach out if you have any questions or need further clarification on my experience. It would be my pleasure to have discussion with you regarding position opened.
Thank you for your consideration and looking forward to hear from you.
Sincerely,

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