

Past Research Achievement Experience relevant to submitted project proposal:

Title of submitted proposal: **"The study of neurocognitive domains in adolescent females with depression and their association with Glutamate and Estrogen Receptor gene variants.**

Since joining the All India Institute of Medical Sciences (AIIMS) Kalyani as an Assistant Professor on December 1, 2022, I have passionately dedicated myself to advancing research in the field of neurocognition, particularly in the context of adolescent depression. In less than two years, I have initiated and actively participated in several research projects that address critical gaps in understanding the neurobiological underpinnings of mental health disorders. My current project on Adolescent Girls with Depression aims to illuminate the intricate connections between biochemical factors and cognitive performance in this vulnerable population. This statement outlines my research achievements, ongoing projects, and the potential societal impact of my work, making a compelling case for the Sun Pharma Clinical Research Fellowship.

Research Background and Focus:

Understanding Adolescent Depression : Adolescent depression is a pressing public health issue, with substantial implications for cognitive development and lifelong mental health. A 2022 survey by Ipsos revealed that approximately 37 percent of people in India reported feeling stressed to a degree that affected their daily lives. Additionally, 24 percent of respondents indicated that they had seriously considered suicide or self-harm. Therefore, adolescents experience depressive disorders, which can severely impair their academic, social, and emotional functioning. This highlights the urgent need for comprehensive research that explores the biological, psychological, and social factors contributing to this phenomenon.

Neurobiological Framework : My research is grounded in a neurobiological framework that examines the roles of key neurotransmitters, hormones, and genetic factors in adolescent depression. In particular, I focus on glutamate, the primary excitatory neurotransmitter, which has been implicated in mood regulation and cognitive function. Additionally, the role of estrogen and its interaction with glutamate in influencing mood and cognition presents a critical area of exploration, particularly in female adolescents who experience hormonal fluctuations during puberty.

Research Achievements : Ongoing and Completed Projects

1.Event Related Potentials and Cognitive Functions in Depression

As a Chief Investigator, I am leading a longitudinal study examining event related potentials (ERPs) and their relationship with cognitive functions in adolescent girls diagnosed with major depressive disorder (MDD). This study aims to identify specific neurophysiological markers associated with cognitive deficits in depression. Preliminary findings suggest that abnormalities in ERP components may correlate with impaired cognitive performance, thereby providing insight into the neural mechanisms underlying depression.

2.Neurocognitive Functions in Stroke Patients Undergoing rTMS

This ongoing research project focuses on assessing neurocognitive functions in cerebrovascular accident (CVA) patients receiving repetitive Transcranial Magnetic Stimulation (rTMS). As a Chief Investigator, I am evaluating the efficacy of rTMS in enhancing cognitive functions such as memory, attention, and executive function. This project aims to provide evidence for rTMS as a viable therapeutic intervention for cognitive rehabilitation in stroke patients.

3. Comparative Study of Cognitive Functions in Anemic and Non-Anemic Women

In collaboration with the Indian Council of Medical Research (ICMR), I co-investigated a project assessing cognitive functions in anemic versus non-anemic women aged 18 to 35 years. This study revealed significant differences in cognitive performance, highlighting the importance of addressing nutritional factors in mental health. The findings are currently under review for publication.

4. Electrodiagnostic Characterization of Neuropathy in Type 2 Diabetes

I successfully completed a project aimed at the electrodiagnostic characterization of diabetic neuropathy in the Indian population. This research not only contributes to the existing body of knowledge on diabetic complications but also provides a basis for future studies investigating neuropathic outcomes in diabetic patients.

5. Comprehensive Evaluation of Stress Factors in Medical and Nursing Students

As the Chief Investigator, I initiated a study to evaluate stress factors experienced by undergraduate medical and nursing students. The objective was to assess the impact of academic pressure on mental health and cognitive functioning. This research aims to develop support mechanisms for students facing mental health challenges.

6. Investigating the Correlation between Nerve Conduction, Inflammation, and Somatosensory Thresholds

This ongoing project seeks to explore the relationship between nerve conduction studies, inflammatory markers, and somatosensory thresholds in diabetic peripheral neuropathy patients. My role as a Co-Investigator involves data collection and analysis, which is critical for understanding the implications of inflammation on neurocognitive functions.

Future Directions: The Proposed Fellowship Project

Project Overview

The proposed project, "The study of neurocognitive domains in adolescent females with depression and their association with Glutamate and Estrogen Receptor gene variants" aims to address the critical gap in understanding how biochemical and genetic factors influence cognitive outcomes in adolescent girls with depression. This research will utilize a multi faceted approach, incorporating cognitive assessments, biochemical analyses of glutamate levels, and genetic screening for estrogen receptor variants.

Outcome of the Fellowship: Contribution to Knowledge and Practice

This fellowship will provide essential support for conducting a robust investigation into the neurobiological underpinnings of adolescent depression. By focusing on the interactions between glutamate, estrogen receptor gene variants, and cognitive function, this research has the potential to:

1. Enhance Understanding: Illuminate the complex biological mechanisms that contribute to cognitive impairments in adolescent depression.
2. Inform Clinical Practice: Provide valuable insights for clinicians, enabling the development of targeted interventions that consider neurobiological profiles.

3. Promote Mental Health: Contribute to public health initiatives aimed at improving mental health outcomes among adolescents, ultimately benefiting society at large.

Passion for Research and Societal Impact

My passion for research is driven by a commitment to improving the lives of adolescents facing mental health challenges. I believe that understanding the neurobiological factors associated with depression is crucial for developing effective treatments and support systems. By securing the Sun Pharma Clinical Research Fellowship, I will be better positioned to conduct high impact research that addresses the urgent need for knowledge in this field.

Conclusion

In summary, my research journey at AIIMS Kalyani has been marked by significant achievements and a steadfast commitment to advancing our understanding of neurocognition in adolescent depression. I am eager to continue this work with the support of the Sun Pharma Clinical Research Fellowship, which will enable me to delve deeper into the complexities of mental health and contribute meaningfully to the betterment of society. I am excited about the prospect of transforming research findings into actionable insights that can improve the lives of adolescents struggling with depression.