

## **ACKNOWLEDGEMENT**

With profound gratitude, I extend my heartfelt praises to the God the supreme creator of this universe, whose benevolent blessings have endowed me with a sound mind and a healthy body. It is through divine grace that I was able to navigate the intricate complexities of my research and bring it to fruition. Words cannot adequately express the depth of my gratitude for the unwavering support received throughout this journey.

As I revel in this moment of achievement, I am delighted to express my profound appreciation and indebtedness to my research supervisor, Dr. Ravi Vijayvargia. His perseverance and commitment to perfection are both contagious and inspiring. His combination of firmness, concern, and faith in me has been the driving force that has led me to this point. I am truly grateful for his attentive listening and readiness to assist whenever needed. Without his support, this journey would not have been possible. Thank you from the bottom of my heart, Sir, for all that you have done for me in all circumstances.

My deepest appreciation goes to the Vice Chancellor, Professor (Dr.) Vijay Kumar Srivastava of The Maharaja Sayajirao University of Baroda, and to Professor Haribhai Kataria, the Dean of the Faculty of Science, for their essential roles in providing the necessary resources and infrastructure to successfully complete my research work. My sincere gratitude also extends to the former Vice Chancellor, Professor Parimal H. Vyas of The Maharaja Sayajirao University of Baroda, for his contributions in providing essential resources during my research.

I take this opportunity to thank Prof. C. Ratna Prabha, Head of the Department of Biochemistry, for her constant support and valuable suggestions. Her leadership and guidance have been instrumental in providing a conducive learning environment and helping me achieve my Ph.D. goals.

I extend my utmost gratitude to the Doctoral Research Committee members, including Dr. Rajesh Patkar, Professor Rajesh Singh, Prof. C. Ratna Prabha, and Dr. Ravi Vijayvargia, for their invaluable contributions to my Ph.D. work. Their insightful suggestions and unwavering encouragement have been instrumental in shaping my research journey. I would also like to express my appreciation to Dr. Laxmipriya P. Nampoothiri for her kind support and guidance throughout my Ph.D. journey, as well as for granting me access to her lab instruments. Special thanks go to Dr. Devesh Suthar for always providing access to his lab.

I sincerely acknowledge the support and guidance of senior professors, Prof. Sarita Gupta, Prof. G. Naresh Kumar, and Prof. Rasheedunnisa Begum, for sharing their scientific expertise and valuable comments whenever needed. I would also like to thank Prof. Pushpa Robin, Dr. Jayshree Phoenekar, and Dr. Sanjeev Upadhyay for their guidance and assistance in all possible ways.

Pursuing a Ph.D. is a life-changing experience both personally and professionally. This Thesis would not have been possible without the support of my family. I am deeply grateful to my beloved parents and siblings for their unwavering support and guidance throughout my life, and especially during my Ph.D. journey. Their selflessness and unconditional love have been a constant source of strength. They have always been there for me, sacrificing their own needs and desires to ensure my well-being and success. Their support has been instrumental in helping me pursue my dreams. I will forever be indebted to them for their love, support, and the sacrifices they have made for me. You always believed in me when I was filled with self-doubt. Thank you for reminding me that success belongs to those who never quit!

I would like to express my utmost appreciation to my beloved wife, Heena Dabhi, for providing constant and unwavering support during my Ph.D. journey. Her presence by my side through all conditions, obstacles, and challenges was a source of immense encouragement and strength when I needed it most. Her unwavering support and understanding have been pivotal in my success, and I am deeply grateful for her presence in my life.

I extend my deepest gratitude to my beloved in-laws for their unwavering support and encouragement throughout my Ph.D. journey. Special thanks to my dear friends, Dr. Tushar More and Dr. Venkatesh, for their unwavering support during my challenging times. Their intellectual contributions were invaluable in helping me navigate through difficult situations.

I would like to extend my heartfelt appreciation to my friend Dr. Joel Christie for his significant contributions to proteomics experimentation and analysis. His expertise and assistance have been invaluable in advancing my research.

I am deeply indebted to my friends and colleagues, Dr. Nishant Parmar and Dr. Jayvadan Vaishnav, for their unwavering assistance and timely help, which made my Ph.D. journey much smoother. I would like to thank my lab members Ms. Sushmita Singh, Ms. Dhruvi Kakadiya, Ms. Ragi Mehta, Ms. Anjali Shah, and Ms. Vrunda Bhatt for their support during my research work. Lab life has been an awesome journey with all of them, filled with lots of lab parties.

I would also like to thank my Ph.D. colleagues from the department, Dr. Akash Dave, Dr. Tanvi Khanna, Mr. Saif Ali, Mr. Sandeep Kumar, Ms. Dhriti Dave, Ms. Ananya Mahapatra, Ms. Minal Mane, Dr. Dhruv Gohel, Ms. Megha Chaudhari, Dr. Milton Roy, Ms. Anjali Shinde, Ms. Bhumi Desai, Mr. Subodh, and Ms. Karishma Bhatia, for their constant support and for creating an enjoyable environment.

I express my sincere gratitude to the M.Sc. dissertation students (Sneha Khedkar, Julie Tahilramani, Gauri, Shivani, Srishti Shekhar, Rohit Satardekar, Anwasha Biswas, Dnyanada, Samruddhi, Pawan Tagadghar, Jayshree Paneri, Nikhil Gedam, Mansi Dhangar, and Dhruv Sonwane) for their hard work and dedication during their research projects. Their presence during my Ph.D. journey has made it a joyous and fulfilling experience. I am grateful for their friendship and support.

My heartfelt appreciation goes to the non-teaching staff who played an integral role in my Ph.D. journey. Mr. Ramesh Nare and Mr. Manish Chauhan provided invaluable assistance with issuing chemicals and consumables, greatly facilitating my research. Mr. Sandip Bandal and Mr. Balvant Gohil's company over a cup of tea provided a refreshing break from the rigors of research. Mr. Anil Mane's diligent work in the office ensured a smooth working environment. Mrs. Axita Thappa assisted with paperwork related to my Ph.D. Finally, Mr. Vijay Parmar and Mr. Shailesh Raval's thorough knowledge of the necessary paperwork required for a Ph.D. student was invaluable, and their timely advice was always appreciated. I am grateful for their tireless efforts and support, which have made my Ph.D. journey much smoother and more enjoyable.

I acknowledge the financial support provided by the Indian Council of Medical Research (ICMR) for SRF and DST-SERB for JRF fellowship.

Lastly, thanks to each person at the University who helped me in some way, making this journey successful.

**July 2024**

**-Rajubhai Khimabhai Dabhi**