COMMENTARY

Upendranath Brahmachari: Revisiting a Forgotten Bengali Scientist behind Cure of Kala-azar

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Abstract

Kala-azar, or visceral leishmaniasis, was once a widespread problem in the Bengal Presidency of British India, encompassing present-day Indian states such as Bengal, Bihar, Assam, and Odisha. The disease was prevalent along the Ganga and Brahmaputra River regions. Upendranath Brahmachari, born on December 19, 1873, emerged as a pioneering figure in the field of medicine, particularly noted for his groundbreaking work in combating Kala-azar in 1920. Upendranath Brahmachari discovered urea stibamine which revolutionized the treatment of Kala-azar. This discovery achieved a cure rate exceeding 90% with minimal side effects. His research also extended to identifying post-kala-azar dermal leishmaniasis, subsequently known as Brahmachari Leishmanoid. Despite nominations for the Nobel Prize in Medicine in 1929 and 1942, Brahmachari's enduring legacy in tropical therapeutics and biochemistry remains underappreciated.

Keywords: Kala-azar, Upendranath Brahmachari, Urea stibamine, Visceral leishmaniasis.

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Introduction and Background

In 1896, Sir William Osler accurately mentioned that "Humanity has but three great enemies: fever, famine, and war; of these by far the greatest, by far the most terrible, is fever."[1] Kala-azar, also known as visceral leishmaniasis, was a fever that claimed millions of lives before 1920. At that time, a 47-year-old Bengali doctor made a groundbreaking discovery in a small room at Campbell Medical College (now Nil Ratan Sarkar Medical College) in Kolkata (now Kolkata). His discovery of Urea Stibamine not only saved numerous lives in India but also in countries such as China, France, and Greece, leading to his nomination for two Nobel Prizes.[2] The discoverer of this revolutionary treatment was Dr Upendranath Brahmachari (Fig. 1). Regrettably, Brahmachari's discovery has lost its significance over time despite his immense contribution. Here, we present a brief biography of this pioneering figure from India.

Early Life and Education

Dr. Brahmachari was born on December 19, 1873, in Jamalpur, Bihar, to Dr Nilmoni Brahmachari, a physician working in the East Indian Railways, and Mrs. Sourav Sundari Devi.[2] He finished his schooling at Eastern Railways Boys' High School in Jamalpur before earning his Bachelor of Arts degree with Honors in Mathematics and Chemistry at Hooghly College (now Hooghly Mohsin College), graduating in 1893. He excelled in Mathematics, earning first place and receiving the Thwaytes Medal. The following year, he earned a Masters in Chemistry from Presidency College, Kolkata. Shifting his focus to medical sciences, he enrolled at Kolkata Medical College, where he obtained a Licentiate in Medicine and Surgery in 1899 and an MB degree in 1900. He topped his class in Medicine and Surgery, receiving the Goodeve and McLeod Medals, respectively. In 1902, he earned his Doctor of Medicine degree and completed his PhD in Physiology from the University of Kolkata in 1904, awarded for his research on "Studies in Hemolysis."

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Professional Career

After completing his medical studies, he began his career as a teacher of Physiology and Materia Medica at Dacca Medical School under Sir Gerald Bomford, where he spent approximately 4 years from 1901 to 1905.[2] Bomford acknowledged Brahmachari's talent and actively urged him to pursue research in the Medical Sciences. Dr Brahmachari subsequently returned to Kolkata and joined Campbell Medical School (now Nil Ratan Sircar Medical College and Hospital) as a faculty member and First Physician in 1905, dedicating approximately 20 years to this institution. Later, in 1923, he transitioned to Kolkata Medical College and retired from that role in 1927. Following retirement, Dr Brahmachari assumed the role of professor of Tropical Diseases at Carmichael Medical

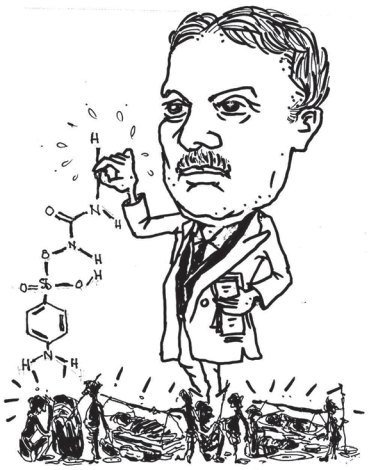

Fig. 1: A sketch of Sir Upendranath Brahmachari portraying his groundbreaking discovery of Urea Stibamine for the cure of Kala-azar, which saved thousands of lives

College, Kolkata. Additionally, he was responsible for the Tropical Disease Ward at the National Medical Institute and also served as the Head of Department and Honorary Professor of Biochemistry at the University Colleges of Science in Kolkata. He possessed a deep understanding of chemistry, physiology, and modern medicine that enabled him to make significant advancements in biomedical sciences.

The Groundbreaking Discovery of Urea Stibamine for Treating Kala-azar

His pivotal achievement was the development of urea stibamine for treating Kala-azar. The first outbreak of Kala-azar was documented in Assam in 1870 and subsequently spread to Bengal and Bihar, affecting the Brahmaputra and Gangetic plains. Despite its devastating impact, the disease's causative agent remained unidentified until the late 19th century.[3] In 1903, William Leishman and Charles Donovan independently discovered the pathogen in autopsy samples from two soldiers—one from Kolkata and the other from Madras. Sir Ronald Ross later named the parasite "Leishmania donovani."[4]

Between 1913 and 1915, Kala-azar was managed by intravenous injections of tartar emetic (potassium salt of antimonyl tartrate), which unfortunately caused cardiovascular and hepatic toxicities as adverse effects. Dr Brahmachari experimented with the sodium salt of antimonyl tartrate, which showed improved results over its potassium counterpart. Subsequently, he explored using powdered and colloidal forms of metallic antimony for treating Kala-azar cases, despite encountering challenges such as availability, storage issues, complex preparation methods, and intricate administration techniques. Dr Brahmachari therefore endeavored to find more effective treatment modalities for Kala-azar. During this period, German physician and chemist Paul Ehrlich demonstrated the efficacy of atoxyl (sodium salt of para-amino arsenic acid) against sleeping sickness in 1905. Inspired by Ehrlich's work, Dr Brahmachari sought to replace the arsenic component of atoxyl with heavy metal antimony for treating Kala-azar patients.[5,6] Despite working in a modest room with limited laboratory facilities at Campbell Hospital, Dr Brahmachari successfully synthesized a potent new compound against Kala-azar named urea stibamine—the urea salt of para-amino phenyl stibnic acid in 1920.[2] Urea stibamine drastically reduced the mortality rate of Kala-azar to 10% by 1925, achieving a remarkable cure rate of 95%.

Other Scientific Achievements of Sir UN Brahmachari

Dr. Brahmachari made another significant contribution to the field of Kala-azar by identifying cutaneous leishmaniasis among patients who had recovered from the disease. This specific type of cutaneous leishmaniasis came to be known as Brahmachari Leishmanoid or its current name, post-kala-azar dermal leishmaniasis.[7] Despite being renowned for his work on Kala-azar, Dr Brahmachari also conducted research on numerous other diseases including diabetes mellitus, malaria, meningitis, lymphatic filariasis, leprosy, influenza, and syphilis.[8,9] He was the first to discover quartan fever in Kolkata and Dhaka. Nominated for the Nobel Prize in Medicine in both 1929 and 1942, Dr Brahmachari unfortunately did not receive the Nobel Prize.

After Ronald Ross discovered that mosquitoes transmit the malaria parasite, Brahmachari dedicated significant time to determining their preference for breeding in shaded water and narrow drains (Campbell, 1902). Additionally, he identified a new species, documented as Brahmachari (1912), which was an anopheline species closely related to Myzomyia listoni.[10]

In 1935, during his tenure as Chairman of the Bengal Red Cross Society, he founded India's first blood bank at the Kolkata School of Tropical Medicine. Throughout his lifetime, he occupied numerous esteemed positions and was honored with several awards. such as Rai Bahadur Fellow, Royal Society of Medicine; Griffith Memorial Prize, University of Kolkata; Minto Medal, Kolkata School of Tropical Medicine and Hygiene (1921); President, Asiatic Society of Bengal (1928–1929, 1931); Professor and Head, Department of Biochemistry, University College of Science, Kolkata (1939–1940); and Nominated for Fellowship of the Royal Society, London (1941–1942).

Records from the Royal Society of London show that Brahmachari's nomination certificate was submitted on June 23, 1941. The certificate highlights his significant contributions to chemotherapy and the treatment of tropical diseases, particularly his pioneering use of Urea Stibamine in treating kala-azar. He authored works such as *Studies in Hemolysis* and *Treatise on Kala-azar* along with approximately 150 publications.[11] The certificate listed his affiliation as Professor of Biochemistry at the University of Kolkata and Professor of Tropical Medicine at Carmichael Medical College. JL Simonsen proposed Brahmachari and MN Saha seconded the nomination. Despite support from many fellows including KS Krishnan, B Sahni, JWW Stephens, and LL Fermor, others like Bhatnagar were not inclined to sign the nomination certificate. Ultimately, Brahmachari did not receive the Nobel Prize, despite being widely regarded as a deserving candidate.

Conclusion

Upendranath Brahmachari's life and work exemplify a remarkable journey of scientific innovation and dedication to public health. His discovery of urea stibamine revolutionized the treatment of Kala-azar, saving countless lives across India and beyond. Brahmachari's contributions extended beyond Kala-azar to encompass a wide array of tropical diseases, showcasing his multidisciplinary expertise in medicine, biochemistry, and public health. Despite his immense achievements and nominations for the Nobel Prize, Brahmachari's legacy has not received the global recognition it deserves. Nevertheless, his pioneering spirit and tireless efforts continue to inspire generations of researchers and medical professionals, underscoring the enduring impact of his

work on tropical medicine and therapeutic advancements. As we revisit the legacy of Upendranath Brahmachari, it is crucial to recognize and celebrate his invaluable contributions to the field of medicine, which have left an indelible mark on global health initiatives.

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