

Dr. Somenath Dutta, Discoverer of Micro-RNA (MiRNA) Therapeutic to Prevent Harmful Zika Virus for Liver Cancer: A Scientometric Portrait

Susanta Koley^{1*}, Sutapa Goswami²

Abstract

Dr. Somenath Dutta's ally Rahul, is a globally recognized scientist for his outstanding recent discovery of "miRNA therapeutics for the Zika virus" at the age of 26 years, which can cure liver cancer and allied health problems due to Zika virus disease. This study covers his 12 publications in a variety of forms, including 07 journal articles (59%), 03 conference papers (25%), 01 dissertation, and 01-chapter paper during 2019–2024. All are published within a short time span of 6 years of his active, productive age, with an average two papers per year, which is a healthy trend. His discovery at the age of 26 lifted him to the first milestone of his success. His first paper appeared in the year 2019 when he was 21 years old. Still now, he contributed different papers in collaboration with 45 (individually 31) coauthors; but he appeared as first author in maximum number of papers, i.e., 07, and they were published in 07 national and international journals. *Journal of Global Oncology* (On behalf of the American Society of Clinical Oncology) is more remarkable as after getting global recognition, his discovery was published in this USA-based journal. His publications are emanating from India, USA, UK, Switzerland, and Bulgaria. Somnath De is his closet collaborator who has published six papers in association with the scientist, with an average of two papers per year. Overall correlation coefficient is 1. Lotka's Law does not satisfy, but the data set of this study validates Bradford's Law.

Keywords: Somenath Dutta, miRNA therapeutics, Zika virus, liver cancer, Pusan National University, Busan, South Korea, scientometric analysis, mosquito-borne transmission

INTRODUCTION

From the several cancer literatures, cancer has answers for specific types of cancer in treatment than earlier. Recently, the young researcher and scientist, a resident of Purulia district, West Bengal, Indian Dr. Somenath Dutta, has discovered a Micro-RNA based technique to prevent Zika virus in case of liver cancer and allied Zika virus diseases. His new and groundbreaking innovation at the age of 26 surprised Bengal, India, as well as whole world. Somenath, along with Dr. Manisha Pritam from the NIH, reached a pivotal milestone in their research in early 2024, and he has gained global recognition for his

*Author for Correspondence

Susanta Koley

E-mail: shayanikoley.2013@gmail.com

¹Librarian, Central Library, Durgapur Institute of Advanced Technology and Management, Durgapur, Paschim Bardhaman, West Bengal, India

²Assistant Librarian, Durgapur Institute of Polytechnic, Durgapur, Paschim Bardhaman, West Bengal, India

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outstanding innovation "miRNA therapeutics" against the HBV virus insisted risk of liver cancer. Today's academic episode is about the young scientist, Dr. Somenath Dutta, describing his biography and research contributions along with new dimensions in the treatment of liver cancer due to Zika virus. In case of multi-scientist research work, equal credit goes to each of the research team and so, this study conveys congratulation to all for their outstanding achievement.

ZIKA VIRUS

Zika virus belongs to the virus family *Flaviviridae*. Zika virus is transmitted primarily by *Aedes* mosquitoes, which bite mostly during the

day. *Aedes* mosquitoes, may be of two types such as *A. aegypti* and *A. albopictus*. Its name comes from the *Ziika Forest* of Uganda. The Zika virus is part of the same genus as dengue, yellow fever, Japanese encephalitis, and West Nile viruses. It has been identified since the 1950s in a specific equatorial zone that spans Africa to Asia. Between 2007 and 2016, the virus spread eastward over the Pacific Ocean to the Americas, culminating in the epidemic that occurred in 2015–2016. The Zika virus, first identified in Uganda, Africa, in 1947. As of 2021 WHO evidence, it has now spread to 89 countries globally, including several in South and East Asia. In 2016, cases were recorded in South Korea and India, and the virus has raised concerns once again in India, particularly in Maharashtra and Karnataka. In July 2021, India experienced an outbreak of Zika virus disease in Kerala State, marking the first such activity in the South-East Asia Region since the Jaipur outbreak in 2018. The initial infection was detected in a pregnant woman in the Trivandrum district, who presented with febrile rash illness. This was the first instance of confirmed Zika virus disease cases in Kerala and Maharashtra, although Gujarat and Rajasthan had reported cases in 2017 and 2018, respectively. The presence of the primary mosquito vector, *Aedes aegypti*, and the less efficient vector, *Aedes albopictus*, in Kerala and Maharashtra states which see annual cases of dengue and chikungunya creates favorable ecological and epidemiological conditions for the potential transmission and endemicity of Zika virus. In December 2023, a 5-year-old girl from Karnataka's Raichur district tested positive for Zika, while an elderly individual in Maharashtra was also confirmed to be infected. On July 16, 2024, Pune, Maharashtra, reported 15 new Zika cases, among which were eight pregnant women. A 74-year-old man in Karnataka died due to this virus. More recently, Pune has seen additional Zika cases, including six pregnant women, bringing the total to 81 cases in the district.

Symptoms of Zika Virus

The Infection, known as Zika fever, also referred to as Zika virus disease. Most people infected with Zika virus do not develop symptoms. This virus usually causes mild illness. Its symptoms appear a few days after a person is bitten by an infected mosquito. Most people with Zika virus disease will get slight fever and rash. Others may also get conjunctivitis, muscle and joint pain, malaise and headache, and feel tired. The symptoms usually finish in 2–7 days. Zika virus infection is associated with Guillain–Barré syndrome (GBS), neuropathy and myelitis in adults and children. GBS is a rare disorder in which the immune system attacks peripheral nerves, affects blood platelets, and elevates the risk of internal bleeding. The virus can be transmitted from a pregnant woman to her fetus, potentially causing microcephaly, serious brain abnormalities, preterm birth, miscarriage, and other birth defects [1].

Treatment

Unfortunately, there isn't a targeted treatment for the Zika virus; however, paracetamol (acetaminophen) and adequate rest can help manage symptoms. As of now, there are no approved vaccines available, but multiple candidates are being tested in clinical trials. Dutta's MiRNA is also one of those [2].

ZIKA, DENGUE, AND CHIKUNGUNYA: MOSQUITO-BORNE TRANSMISSION

The Zika virus is like dengue and chikungunya. Both are transmitted through the bite of the mosquito. The name of the mosquito is *Aedes*, and they may be of two types such as *Aedes aegypti*, and *Aedes albopictus*. They can spread dengue fever, chikungunya, Zika fever, Mayaro and yellow fever viruses, and other disease agent [3].

Aedes Aegypti

It is known as the yellow fever mosquito. It is identifiable by its distinctive black and white striped legs and a lyre-shaped marking on the upper surface of its thorax. This mosquito originated in Africa, but this species has now spread to tropical, subtropical, and temperate regions around the globe [4].

Aedes Albopictus

It also is a member of the mosquito (Culicidae) family. It is also known as the (Asian) tiger mosquito or forest mosquito. It is a mosquito native to the tropical and subtropical areas of Southeast Asia. It is characterized by the white bands on its legs and body [5].

Spread of Zika Virus

Infected mosquitoes spread Zika among people through bite. Zika virus disease is so called mosquito-borne transmission disease. It also can spread to sex partner, if Zika infected person does sex without taking proper protection. Infected woman passes Zika to her fetus during pregnancy. Any infected person passes this virus to others, if mosquito is bitten. Zika virus attack can take people's lives. Affected child may find incomplete brain development and face lifelong challenges [6].

MicroRNAs (miRNAs)

MicroRNAs (miRNAs) are short, non-coding RNA molecules that play a key role in regulating gene expression. They function by binding to messenger RNA (mRNA), causing either its degradation or blocking its translation into proteins [7]. This mechanism is vital for maintaining cellular functions and adapting to various physiological changes such as those triggered by viral infections. In the case of Zika virus infection, the virus takes over the host's cellular mechanisms, leading to the downregulation of certain miRNAs [8]. This downregulation affects the regulation of mRNAs, which can promote viral replication and potentially cause significant harm to the human body. Somenath Dutta and his research team have recently discovered miRNAs that could function as potential therapeutic agents in the fight against the Zika virus. It could bring hope to people that his new therapeutic agent will be helpful in the treatment of liver cancer and allied Zika virus diseases [9].

Early Life and Education

The young scientist, Dr. Somenath Dutta was born to Mr. Karno Lal Dutta, an LIC agent and Mrs. Purnima (housewife) in 1998 in Pancha village, Purulia district, West Bengal, India. Somenath passed Madhyamik from *Laulara Radha Charan Academy* in 2015 in Pancha, Laulara, Purulia district. He completed his higher secondary education also from the same school in 2017 and later earned his Bachelor's degree in Biotechnology from *Panskura Banamali College* (Autonomous) during 2017–2020 under *Vidyasagar University, West Bengal*. During 2020–2022, Mr. Dutta completed his M.Sc. in Bioinformatics from Pondicherry Central University with distinction. In 2023, Somenath received his Ph.D. degree in Computational Medicinal Chemistry from Pusan National University, Busan, South Korea. Dr. Somenath was a student of middle intelligence. His invincible effort and hard work bring his success and moves him toward the stairs to the top [10].

He also completed several courses viz, Diploma in Computer Application in 2016 at *Mahatma Gandhi National Youth, India, West Bengal, India*; *Basic Spanish Language (certified) course* in 2019; Green Skill Development Program (GSDP-2020) from Centre for Ecological Sciences, Indian Institute of Science (IISc) Bengaluru, India in 2020; and Computed Assisted Drug Design (CADD) at *Birla Institute of Scientific Research (BISR), Design Innovation Centre (DIC), Rajasthan, India* in 2021. Apart, he also participated in training programme and short-term courses at national and international level, like 2020: e-short Term Course on "Plant Propagation and Nursery Management", Organized by *Department of Botany of Shri Shivaji Science and Arts College, Chikhali, India*. 2021: Training on "Genes to Pathway: Second Edition", organized by *DE code LIFE, India*; Training on "How to Excel in Maintaining Biological Data", organized by *Rajiv Gandhi Proudhyogiki Vishwavidyalaya, Bhopal, India*; Training Program on "NGS Data Analysis in Bioinformatics", organized by *DYJ Life Sciences Pvt. Ltd registered by Indian Ministry of M.S.M.E.*; International online certificate course on "Best Practices for Biomedical Research Data Management", jointly organized by *Harvard Medical School, National Institutes of Health (NIH)*.; 6-week e-short Term Course on "Epidemiology: The Basic Science of Public Health", organized by *University of North Carolina at Chapel Hill, United States*; 2-week e-short Term Course on "Ensembl Browser", organized by *European Molecular Biology Laboratory-EBL, Europe*; Short Term Course on "Data Analytics and Predictive Technologies", organized by *I-Dept Hub Foundation, IIT-BHU, Varanasi, India*; Online Certified-course in "Advanced Excel", authorized by *Elearnmarkets*; Three months Virtual Training on "Genomics4Health", organized by *ICMR-NIRTH, India*. 2022: Skill/Training Program on "Analytical Instrumentation Techniques for Environmental Organic Contaminants", organized by *CSIR-National Environmental Engineering Research Institute*; Training Program on "Application of Biostatistics in Health Research",

organized by ICMR - National Institute for Research in Environmental Health. 2023: Certificate Course on “Introduction to Data and Data Science”, Certified by 365 Data Science [11].

RESEARCH CAREER

After finishing his master’s degree in 2022, he started his research work at various institutions. He worked as *Young Research Fellow* at *International Institute of Information Technology (IIIT), Hyderabad, India* and admitted *International Pre-Ph.D. Program* at the *Institute of Advanced Materials, Sweden*. Prior to these, he was also associated with different research activities, like *Summer Research Trainee (CSIR-SRTP) in Council of Scientific and Industrial Research–North East Institute of Science and Technology (CSIR–NEIST), Jorhat, Assam, India, in 2020*; *Summer Research Fellow in All India Institute of Medical Science (AIIMS) New Delhi, India, in 2021*. During his academic career, Somenath was involved in various research-based projects, which are : (i) *Search for Reasons behind Asymmetric Global Distribution of M. Lepromatosis as Causative Agent of Leprosy and Comparison of Lipid Metabolism in M. Lepre Complex Bacteria by Genomics in 2019*, jointly organized by Amity University Kolkata, and Pine Biotech, Tauber Bioinformatics Research Center, Israel; (ii) *In vitro Phytochemical Analysis and Anthelmintic Activity of Acacia Nilotica Whole Plant Methanolic and Aqueous Extract on Indian Adult Earthworm (B.Sc. Thesis) in 2020*, under the Supervision of Dr. Somnath De, Assistant Professor, Department of Biotechnology, Panskura Banamali College, Vidyasagar University, West Bengal, India; (iii) *In-vitro Anthelmintic Activity of Akanda (Calotropis gigantea L.) Whole Plant Methanolic Extract in Indian Adult Earthworm in 2020*, under the leadership of Supervisor, Dr. Snigdha Pattnaik & Dr. Taraprasanna Dash, (CSIR–NEIST), Jorhat, Assam, India; (iv) *Proteomics Analysis on Therapeutic Protein Identification present in Mesenchymal Stem Cell Derived Exosomes in 2021*, under the supervision and guidance of Prof. Sujata Mohanty, All India Institute of Medical Science (AIIMS) New Delhi, India; (v) *Computational Analysis of Spike Protein of SARS-CoV-2 (Omicron variant) for Development of Peptide-Based Therapeutics and Diagnostics in 2021*, guided by Dr. M. Krishnamohan, Scientist of Birla Institute Of Scientific Research (BISR) Rajasthan, India; (vi) *In silico study of anti-viral phytochemicals for the potential drug development against wild and Omicron mutant sites of SARS-CoV2. (M.Sc. Thesis) in 2022*, under the Supervisor, Prof. Amutha Ramaswamy, Department of Bioinformatics, Pondicherry Central University, Puducherry, India; and (vii) *3D Glycan Movement Emulation in 2023, under the Supervision of Prof. Kiyoko F. Aoki-Kinoshita, Soka University, Japan*. Dr. Dutta has showcased his research at various national and international conferences, emphasizing his expertise in Drug Designing and Next Generation Sequencing (NGS) [12]. His dedication and determination have led to significant accomplishments in these areas. Finally, Dutta completed his Ph.D. in 2023 in the fields of Computational Medicinal Chemistry, Personalized Medicine, Biomolecular Engineering, Vaccine Design, Omics. His research in recent years has emphasized the use of computational drug discovery, transcriptomics, and genomics methodologies to perform comprehensive data analytics for novel genomics technologies in fundamental and translational research. Over the years, he is dedicating his research efforts to various fields, including drug design, vaccine design, machine learning, bioinformatics, and computational biology [13].

RESEARCH IMPLICATION

Since there is no vaccine or effective treatment available for Zika virus yet, Micro-RNA, his groundbreaking discovery in the 21st century, created ripples globally and raises hope to fight against infection of Zika Virus, including Liver Cancer. His research work on miRNAs and RNA-based drug design raises hope for people that can be served as a bridge between computational biology and clinical or medical applications. Through analyzing the relationships between miRNAs and mRNAs, Somenath and his team discovered several miRNAs that could serve as potential therapeutic agents. By delivering these miRNAs into the body, they aim to restore normal gene expression, thereby hindering the virus’s capacity to replicate and spread. For instance, the downregulation of certain miRNAs correlates with the upregulation of specific mRNAs associated with viral replication. By reintroducing these miRNAs or mimicking their actions, the upregulated mRNAs can be brought back to normal levels, helping to disrupt the virus’s lifecycle and mitigate the infection’s severity. This discovery marks a significant

advancement in the development of miRNA-based therapies. While traditional antiviral medications target the virus directly, miRNA therapy modifies the host's immune response, providing a more targeted and less toxic alternative [14].

PROFESSIONAL JOURNEY

Dr. Dutta's affiliation history tells he started his professional career as a Research Intern from 2019. He completed 4 months' *workshop cum project work on Bioinformatics*, during July–October 2019, organized by *Amity University, Kolkata*, under the sponsorship of *Tauber Bioinformatics Research Center, Israel*. Then he joined as trainee on February 2020 at *Indian Institute of Sciences, Centre for Ecological Science, Bengaluru, India* and continued till March 2020. After that, he served as Summer Intern from June to August for *CSIR-Summer Research Training Programme - 2020 at the Department of Biotechnology, North East Institute of Science & Technology, Jorhat, India*; and from May to August, 2021 at *All India Institute of Medical Sciences, DBT-Centre of Excellence for Stem Cell Research, New Delhi, India*, under the Project, "*Identification of therapeutic proteins present in mesenchymal stem cell-derived exosomes*". From September 2021 to February 2023, he was associated as Trainee-CADD with the *Department of Biotechnology, Birla Institute of Scientific Research, Jaipur, India* for a project work "*Designing Multi-Epitope Vaccine against SARS-CoV-2 using the immunoinformatic breakthrough*". Later, he joined as *Pre-PhD Fellow in Computational Biology* from June 2022 at the *Institute of Advanced Materials, IAAM, Sweden*; and simultaneously, on the same month, he began working as *Young Research Fellow at International Institute of Information Technology, IHub-Data, Hyderabad*. He stayed at both the institutes till November 2023. Now, he is working as *Graduate Student as well as Doctoral fellow at Pusan National University, Division of Chemical and Biomolecular Engineering, Busan, South Korea*. He completed his Ph.D. and he got global recognition for his outstanding contribution and discovery from this university [15].

Global Recognition of the Young Scientist

Somenath is presently working on *miRNA-based therapeutics* under the guidance of Professor Lee at Pusan National University. In 2023, a workshop was held at the National University of Singapore, organized by a team of 30 researchers from the United States, among which only two Asian researchers were chosen. Somenath from India was one of them and was supported by grants from both the USA and Korea. In early 2024, Somenath, in partnership with Dr. Manisha Pritam from the NIH, made a significant breakthrough in their research. They shared their discoveries at the *Global Cancer Symposium* hosted by the *National Cancer Institute and the National Institutes of Health*, demonstrating the link between HBV virus and an increased risk of liver cancer, as well as the potential of miRNA therapeutics as a cure. This important research work was later published in the *American Society of Clinical Oncology Journal "Journal of Global Oncology, Vol. 10, No. Suppl. 1"* on July 2024. In June 2024, a workshop and conference organized by the *Human Cell Atlas* took place in Bangkok, focused on the future implications of Single Cell Genomics. The expenses of entire event were funded by Zuckerberg's organization, allowing Somenath to collaborate with a team of scientists from MIT. After that, Somenath's work drew the attention of the distinguished *Max Planck Institute*. His research on the Zika virus has been chosen for presentation at the *Max Planck Horizons Symposium 2024*, held on September, and his participation grant was fully paid by the German government. Each year, only two or three researchers worldwide are awarded this grant. *The Max Planck Institute* is renowned for its research achievements, having been associated with 39 Nobel laureates. At the symposium, Somenath will have the chance to present alongside top researchers from Oxford, Cambridge, Harvard, and other leading institutions. This recognition marks a significant milestone for both Korea and India, highlighting the promise of young researchers in addressing urgent health issues through innovative science. Getting this chance of presentation by Somenath and his team received highly respectable recognition globally. It will support Somenath to pass each milestone to reach top of the success, and his team research will give mankind more benefits in future [16].

AWARDS, ACHIEVEMENTS, AND FELLOWSHIPS

Dr. Dutta received many honors and awards, achievements and fellowships.

2017

Best Poster Presentation Award from *National Seminar on Health and Ecology: The Interaction and Interdependence*, West Bengal, India.

2019

Secured 2nd Position (Silver Medal) in *Science Model Competition (UG)*: West Bengal State Council of Science & Technology

2020

Selected for Merit-cum-Means Scholarship and Top Performer by *the Department of Bioinformatics*, Pondicherry Central University

2021

- i. Selected for Merit Scholarship for securing Highest SGPA in 2nd Semester of M.Sc., Department of Bioinformatics, Pondicherry Central University.
- ii. Secured 3rd Position among 291 Campus Ambassador at E-CELL IIT Hyderabad, India.

2022

Selected for Merit-cum-Means Scholarship (Top Performer): Department of Bioinformatics, Pondicherry Central University

2023

- i. Secured First Prize in Quiz Competition at the 2nd Asian Student Council Symposium hosted by. ISCB: International Society for Computational Biology.
- ii. Registration fees funded by National Science Foundation; USA & Travel Fellowship funded by National Research Foundation of Korea for CompBio - 2023 at National University of Singapore.

2024

- i. Travel and accommodation funded by Chan Zuckerberg Initiative and Human Cell Atlas for Single-Cell Omics in-person Computational and Experimental Design Workshop at Mahidol University, Thailand.
- ii. Selected for the Mini-Fellowship Program on Molecular Imaging at School of Medicine, Stanford University.

Organizational Membership

Dr. Dutta has been playing several roles as a member or mentor or ambassador, scientific reviewer, or research volunteer. Some may mention.

2020

Campus Ambassador at Dr. APJ Abdul Kalam Research Foundation; and E-Cell IIT Hyderabad.

2021

- i. Scientific Reviewer for International Healthcare Research Journal (IHRJ).
- ii. Research Volunteer at COVID-KOSHA [17].

2022

- i. Mentor in Teach for Science Fellowship under Progressive Regional Association of Youth for Advancement of Sciences in association with the Indian National Young Academy of Sciences (INYAS).
- ii. Associate Member at Progressive Regional Association of Youth for Advancement of Sciences (PRAYAS).
- iii. Student Chapter Chair (Core Member) in BIOinformatics CLU**b** for Experimenting Scientists (BIOCLUES).

- iv. Review Board Members Medicon Microbiology (MCMI) Publishers.
- v. Bentham Ambassador at Bentham Science Publishers [18].

2023

- i. Ambassador of Asia at Immunopaedia;
- ii. Mentor at The Social Scientist.
- iii. Member of American Society of Clinical Oncology.
- iv. Invited to Speak as a Guest at Sinhgad College of Pharmacy.
- v. Global Outreach - Student Member of American Society for Microbiology.
- vi. Member of Asia-Pacific Bioinformatics Network (APBioNET);
- vii. Student Ambassador Fellow of Asia-Pacific Bioinformatics Network (APBioNET) [19].

2024

- i. Member of American Society for Clinical Pharmacology and Therapeutics.
- ii. Member of Human Genome Organization (HUGO-USA).
- iii. Member of The Antibody Society [20].

Workshops, Seminars, and Conferences (WSC) Attended

Dr. Somenath attended various workshops, seminars and conferences, etc. at national and international level. Statistics says that he was present at different WSCs year-wise: 2 in 2024; 3 in 2023; 12 in 2022; 16 in 2021; and 13 in 2020. In addition, he also likes to participate in Quiz Competitions at different levels, such as *International Level E-Quiz on "Bioinformatics"*, organized by Holy Cross College of Management and Technology, 2020; *Biotechnology E-Quiz Programme*, organized by Karpagam Academy of Higher Education, 2020; *Online Essay Writing Event*, organized by Panskura Banamali College (Autonomous), West Bengal, India, 2020; *Online Quiz*, organized by Panskura Banamali College (Autonomous), West Bengal, India, 2020 [21].

OBJECTIVES

The main objectives of this study are:

- a. To find year-wise publications of Somenath Dutta with authorship pattern.
- b. To observe his position as main author and coauthor.
- c. To calculate the degree of collaboration.
- d. To measure author productivity.
- e. To identify age-wise publication pattern.
- f. To find a research team with coauthors.
- g. To identify the preferred journals.
- h. To calculate Growth Rate of publications.
- i. To test validation of the Lotka's Law and Bradford's law.

MATERIALS AND METHODOLOGY

This study covers 12 publications of Dr. Dutta with special reference to Zika virus during the period 2019–2024. His publications include 07 journal articles, 03 conference proceedings, 01 poster presentations, 01 dissertation published in different publication media in India and abroad. All the publications have been extracted from ResearchGate (RG), Google Scholar (GS) databases, and scientist's web site. In addition, other data has been collected from various offline and online sources. A compiled data sheet of his publications was prepared for this study. Then all data were taken into MS-Excel and Words and tabulated for reaching the points as per objectives of this study. Finally, finding statements are prepared one by one and discussed in the following sections [22].

REVIEW OF LITERATURE

There are many bibliometric studies carried out by many librarians and information scientists. However, some of them were reviewed subject-wise chronologically: Kademami, Kalyane and Kademami (1994) worked on Nobel laureate, Dr. C V Ramo, an profound Physicist; Kademami and

Kalyane, (1998) has done a bibliometric study on Nuclear Physicist, R. Chidambaram; Koley and Sen, (2006) made assessment on Prof. B N Koley, an eminent Physiologist; A work on the Plant Biologist, Dr. K. Veluthambi was analyzed by Srimurugan & Nattar, (2008) ; a study of or about Nayana Nanda Borthakur, a Biometeorologist has been carried out by Hazarika, Sarma and Sen (2010); an analytical study of Eugene Garfield, a Linguist and Businessman, a Founder of bibliometrics and scientometrics was done by Sangam and Savanur (2010); a biobibliometric portrait of Professor Mahalanobis, a Indian Statistician was published by Mondal, Raychoudhury and Sarkhel (2018); Dutta (2019) carried out a study on Prof. B K Sen, Librarian, Information Scientist and Scientometrician; a study on Stephen William Hawking, a Physicist was shared by Teli and Maity (2021); Recently, a statistical analysis of Professor Madhav Gadgil , an Ecologist and Environmental Scientist was recorded; two works on medical scientists on Prof. Subhas Mukherjee, creator of Indian IVF baby, and Prof. Dlip Mahalanobis, ORS pioneer, were carried out by S. Koley, (2024, 2023); a work on Dr Raghuram Rajan, Economist and Govern of RBI was also done by Behera and Meher (2024); and many more. Notwithstanding the bibliometric study on the young scientist, Dr. Somenath Dutta, in the field of Computational Medicinal Chemistry, no one has yet done. So, it is an original work, and time to assess his research contributions through such scientometric analysis [23].

RESULTS AND DISCUSSIONS

Year-and-Age-Wise Publications

Table 1 shows year-and-age-wise publication pattern. During the short time span of 6 years (2019–2024), he has published 12 papers, all of which are multi-authored papers. Total 45 coauthors were involved for this purpose. His first paper was published in 2019, when he was 21 years old, i.e., too young. So, Dr. Dutta is considered a young researcher and scientist, whose innovation of Micro-RNA treatment against Zika virus trembled the world and raises hopes for betterment for mankind. He has no single-authored paper, i.e., papers without collaboration. Chronologically, the highest number of papers, i.e., three have been published in the year 2020 and 2022 when his age was 20–24, followed by second highest production, i.e., 2 each in 2019 and 2013. Since he has no single authored paper, all over DC value has found as 1. Figure 1 draws a chart using clustered columns to show year and age-wise paper publications.

Table 1. Year-and-age-wise publication of books of Somenath Dutta, 2019–2024.

Year	TP	CP	AA (b. 1998)	PPA	SAP	MAP	Authorship Status			CoA	DC = MAP/TP
							1 st	2 nd	4 th		
2019	2	2	21	1	0	2	1	1	0	07	1.00
2020	3	5	22	2	0	3	1	2	0	16	1.00
2021	1	6	23	3	0	1	1	0	0	05	1.00
2022	3	9	24	4	0	3	2	0	1	10	1.00
2023	2	11	25	5	0	2	1	1	0	06	1.00
2024	1	12	26	6	0	1	0	1	0	01	1.00
Total	12	–	–	–	0	12	06	05	01	45	1.00

Abbreviations: TP = Total papers, CP = Cumulative papers, AA = Author's age, PPA = Publication Productive age, SAP = Single-authored paper, MAP = Multiple-authored paper, CoA = Coauthor, DC = Degree of collaboration.

Authorship Pattern

Tables 2 and 3 enumerate pattern of collaboration, and time span of publications. Of 12, the maximum number of papers, i.e., each 3 was published as two-authored and five-authored paper; two six-authored, and one each is 3-4-8-9 authored paper. Two three-authored, and three five-authored papers have been produced during the time span of 5 years each. Two six-authored papers were published in the time span of 2 years. Each remaining type of papers took 1 year to be published. Multi-authored publications indicate that team research is being carried out by Somenath.

Status in Byline of Authors

Table 4 shows position in the byline of authorships. Dr. Dutta has appeared in 06 papers as first author, in 05 papers as second author and in one as fourth author. Out of 3 two-authored papers, he was

as author in 1st position in two, second position in one; and in three–five authored papers, he occupied 1st position in one paper, and 2nd position in two papers. Out of two six-authored papers, he ranked first and fourth position in one paper each. Apart, he received 1st position in one two-authored, one four-authored papers. Besides, he got 2nd position in one eight-authored and one nine-authored paper.

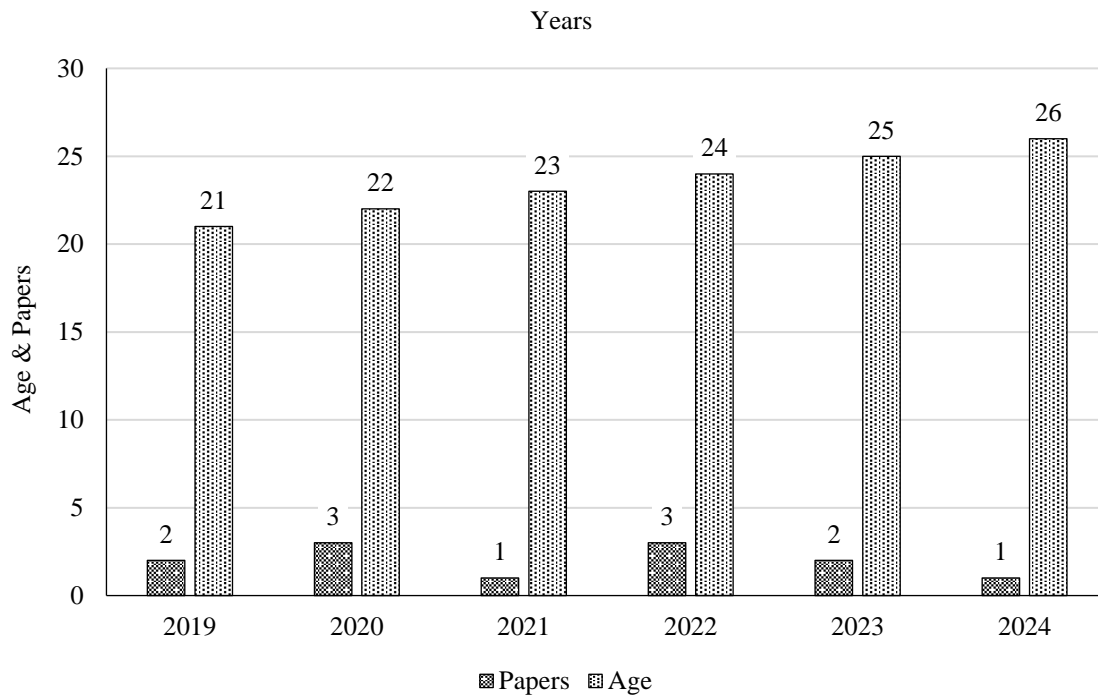


Figure 1. Year and age wise publication of Somenath.

Table 2. Pattern of authorship.

Number of authors	Single	Two	Three	Four	Five	Six	Eight	Nine	Total
Non-collaborative papers	00								00
Collaborative papers	–	3	1	1	3	2	1	1	12

Table 3. Time span of publications.

Number of authors	Single	Two	Three	Four	Five	Six	Eight	Nine
Number of papers	00	3	1	1	3	2	1	1
Time span (Total)	00	5	1	1	5	2	1	1
Year-range	–	2020–2024	2023–2023	2019–2019	2019–2023	2021–2022	2020–2020	2020–2020

Table 4. Position in the byline in collaborative papers.

Position Authorship Pattern	1 st	2 nd	4 th	Total Publications
Two-authored	2	1		03
Three-authored	1			01
Four-authored	1			01
Five-authored	1	2		03
Six-authored	1		1	02
Eight-authored		1		01
Nine-authored		1		01
Total	06	05	01	12

Leading Collaborators

Table 5 enlists the names of the collaborators according to individual paper production with Dr. Dutta, including year of first and last publication, average paper per year. Somenath De is his closest collaborator who has produced maximum number of papers, i.e., six with the scientist in the time span of 3 years, i.e., two papers per year, followed by Dulal Chandra Das with four papers for 2 years, i.e., two papers each year. A group of two collaborators includes three papers each for Rohan Ghosh and Manisha Pritam, for which they spent 1 year and 2 years, respectively. So, they have produced yearly three papers, and nearly 2 (1.5) per annum, respectively. Another category of two authors each has appeared with Dutta in two papers, such as Monalisha Das and Shilpa Daw, who have published two papers and one paper per year, respectively. A class of other 25 collaborators has published one paper each. Figure 2 represents highly productive collaborators of Somenath.

Table 5. Names of leading collaborators of Somenath.

S.N.	Coauthor's Name	Papers	FYP	LYP	Year Taken = LYP – FYP	Paper per Year
1	De, Somenath	6	2019	2021	3	2
2	Das, Dulal Chandra	4	2019	2020	2	2
3	Ghosh, Rohan	3	2022	2022	1	3
4	Pritam, Manisha	3	2023	2024	2	1.5
5	Das, Monalisha	2	2019	2019	1	2
6	Daw, Shilpa	2	2021	2022	2	1
7	Bandyopadhyay, Meholy	1	2020	2020	1	1
8	Banerjee, Pritam	1	2020	2020	1	1
9	Bhowmik, Subhajit	1	2020	2020	1	1
10	Das, Adrinil	1	2020	2020	1	1
11	Dey, Sankar	1	2021	2021	1	1
12	Ganguly, Soumya Sarathi	1	2021	2021	1	1
13	Ghosh, Debanjan	1	2022	2022	1	1
14	Ghosh, Shreya	1	2020	2020	1	1
15	Goswami, Anushka	1	2020	2020	1	1
16	Kumar, Rajnish	1	2023	2023	1	1
17	Maity, Debjit	1	2020	2020	1	1
18	Medicherla, Krishna	1	2023	2023	1	1
19	Mukherjee, Dattatreya	1	2021	2021	1	1
20	Nath, Rabindra	1	2020	2020	1	1
21	Pramanik, Santanu	1	2020	2020	1	1
22	Pramanik, Madhumita	1	2020	2020	1	1
23	Rana, Subham	1	2020	2020	1	1
24	Ranjan, Rajat	1	2022	2022	1	1
25	Sahu, Riya	1	2022	2022	1	1
26	Samanta, Piyali	1	2020	2020	1	1
27	Santra, Priyasa	1	2022	2022	1	1
28	Sharma, Praharshit	1	2022	2022	1	1
29	Singh, Mahendra	1	2022	2022	1	1
30	Singh, Satarudra	1	2023	2023	1	1
31	Verma, Ananya	1	2023	2023	1	1

Abbreviations: FYP = First year of publication, LYP = Last year of publication.

Validation of Lotka's Law

As per Lotka's law, 60% of total authors should have one paper each, 15% will have two papers each, and 7% authors have three papers each. In this study, the total coauthors are 45 (Table 1). Out of which, each of 25, i.e., 55.56% ($\neq 60\%$) authors have single paper; each of 2 (4.45% $\neq 15\%$) authors have two papers, and so on. From this calculation, the data set of this study does not satisfy the rules of Lotka's Law.

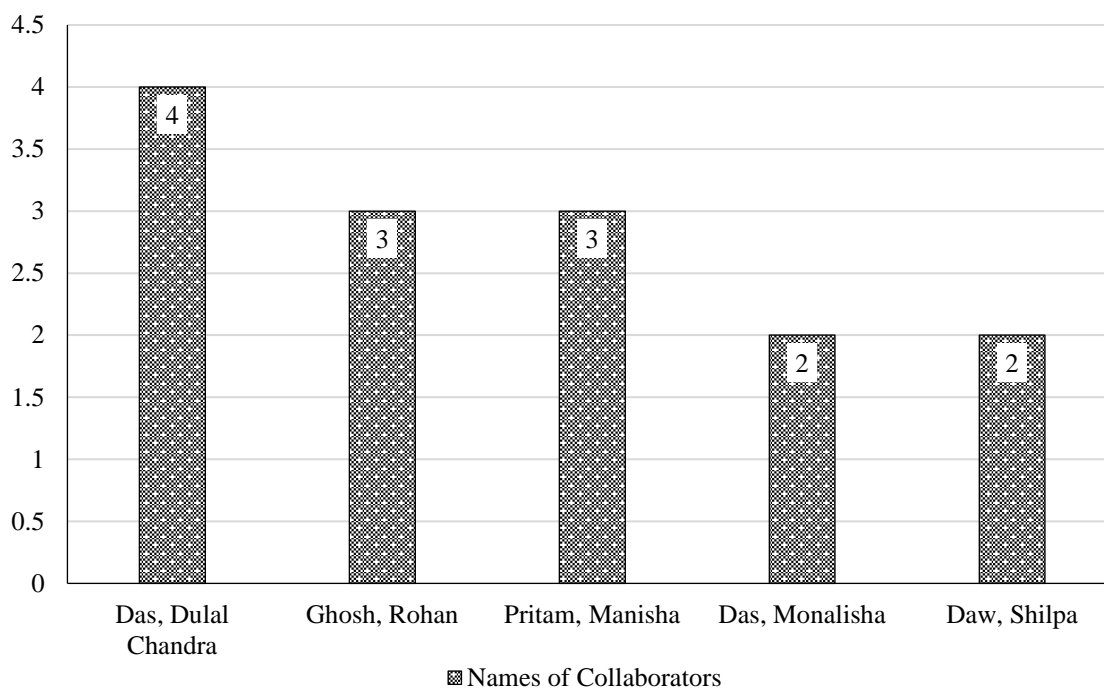


Figure 2. Graphical representation of shares of closest 5 coauthors.

Table 6. Communication channels.

S.N.	Communication Channels	Papers	FYP	LYP	IF	Country
	<i>Journal Articles [JA] (7, 7)</i>					
1	Journal of Global Oncology (On behalf of the American Society of Clinical Oncology)	1	2024	2024	3.2	USA.
2	Indian Journal of Medical Research and Pharmaceutical Sciences	1	2020	2020	4.054	India.
3	International Journal of Applied Dental Sciences	1	2020	2020	5.79	India.
4	International Journal of Behavioural and Healthcare Research.	1	2022	2022	2.4	Switzerland.
5	Journal of Biomolecular Structure & Dynamics.	1	2023	2023	0.3	UK.
6	The Journal of Phytopharmacology	1	2019	2019	5.16	India.
7	World Journal of Pharmacy and Pharmaceutical Sciences	1	2019	2019	8.025	Bulgaria.
	<i>Conference Papers [CP] (3, 3)</i>					
8	International Conference on Advances in Biotechnology: Current Discoveries & Future Perspectives, 17–18 October, 2023: Amity Institute of Biotechnology.	1	2023	2023		India.
9	Bioindica 2022, Department of Computational Biology and Bioinformatics, University of Kerala, State Inter-University Centre of Excellence in Bioinformatics, DBT-BIF	1	2022	2022		India.
10	[Conference at] Paskura Banamali College (Autonomous), March 2021.	1	2021	2021		India.
	<i>Thesis (1, 1)</i>					
11	B.Sc. Dissertation. Department of Biotechnology, Panskura Banamali College, Vidyasagar University, West Bengal, India (Published in ResearchGate).	1	2020	2020		India.
	<i>Book Chapter [BC] (1,1)</i>					
12	Research Insights of Life Science Students (Volume – 3) (pp. 1309): JPS Scientific Publications.	1	2022	2022		India.

Abbreviation: IF = Impact factor.

Publication Channels

Table 6 enlists types of publication channels, including number of publications, year of first and last publication, origin and impact factors of the journals where his research papers have been published. The list includes seven journals, three conference proceedings, one dissertation, and one editorial book wherein a chapter was contributed by him. His first paper appeared in highly impact factor (IF 8.025) journal *World Journal of Pharmacy and Pharmaceutical Sciences* (f. 2012) in 2019, emanating from Bulgaria. He also published one paper each in different foreign journals, like *International Journal of Behavioural and Healthcare Research* (f. 2016), Switzerland, in 2022; *Journal of Biomolecular Structure & Dynamics*(f1983), UK, in 2023; and *JCO Global Oncology* (f2020), USA, formally *Journal of Global Oncology* (f 2015), on behalf of the American Society of Clinical Oncology, in 2024. His 3 papers were published in different Indian journals, such as *Indian Journal of Medical Research and Pharmaceutical Sciences* (f 2014), *International Journal of Applied Dental Sciences* (f. 2014), and *The Journal of Phytopharmacology* (f. 2012), and remaining publications other than journal articles have also emanated from India.

Bradford's Law

In this study, first zone with first 04 journals with 33.33% of total publications; second zone consists of next 04 communication channels for 33.33% of publications; and finally, third zone covers last 04 channels with 33.34% publications. Therefore, the data set for publication channels validates Bradford's Law. Figure 3 highlights type of form of documents published by Somenath.

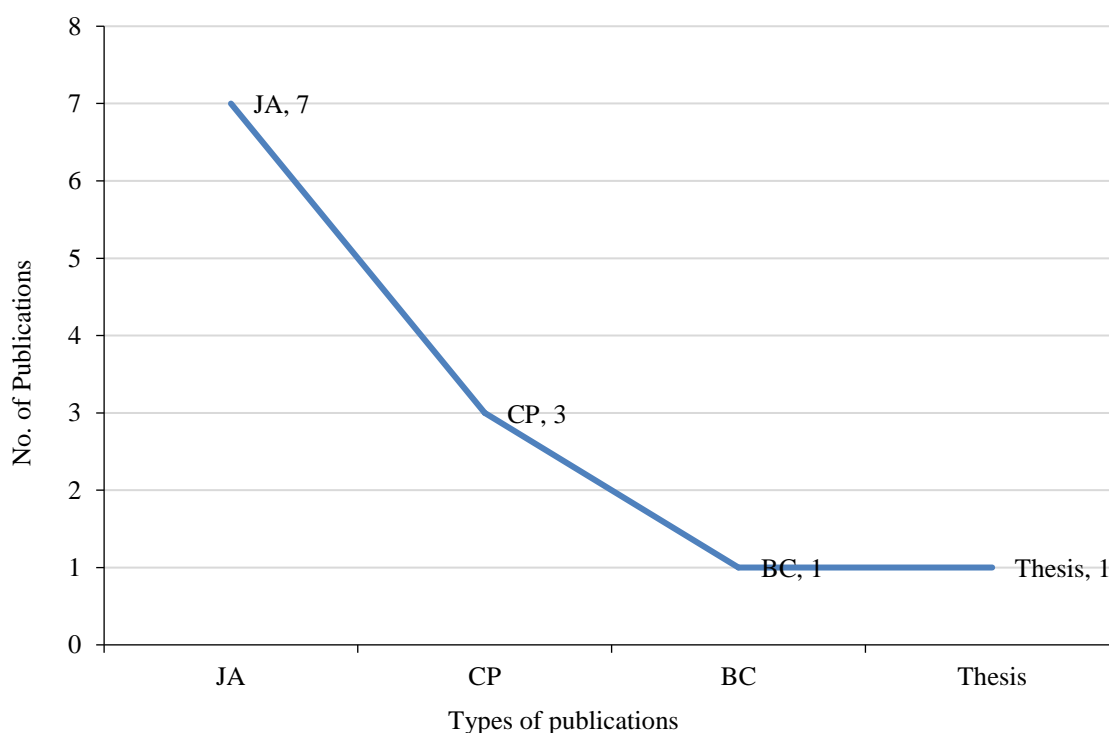


Figure 3. Form of publication channel.

Growth of Publication

Table 7 shows Annual Growth Rate (AGR), and Cumulative Annual Growth Rate (CAGR) of Somnath's publication during 2019–2024. By the formula, Annual Growth Rate (AGR) = $\{(End\ Value - First\ Value) \times 100\} / First\ Value$ (Jain and Meera, 2022). For example, the first 2 years are 2019 (starting year) to 2020 (ending year). Here, APC of the year 2019 is to be considered as first value = 2 and the same of the year is to be taken as end value = 3. So, putting the both the values in the formula, $\{(3 - 2) \times 100\} / 2 = AGR = 50$; again, for the next 2 years 2020 to 2021, here First value = 3 and End

value = 1, similarly, $\{(1 - 3) \times 100\} / 3 = \text{AGR} = -66.67$, and so on. Using same formula, values of CAGR have also been calculated. During 6 years of his productive career starting, out of his 12 papers, 4 (33%) papers were international level publication with an average of 0.67 articles per year and 8 (67%) papers at national level, i.e., 1.34 papers per year. As per Table 7, in 2021–2022, there is an increase of 200% from 1 to 3 publications: in 2019–2020 from 2 to 3 publications with a 50% growth, and in 2022–2023 from 2 to 11 publications with a yearly 33.34% growth. In cumulative annual growth, it was observed that during years 2019–2020, a growth is 150% from the previous year. After that, the CAGR varies from 20% to 50%. As 2024 is not yet complete, this study does not include AGR calculation for this year.

Table 7. Annual growth rate of Somenath’s publications.

Year	APC	CAPC	Annual Growth Rate (%) [AGR]	Cumulative Annual Growth Rate (%) [CAGR]
2019	2	2	–	–
2020	3	5	50	150
2021	1	6	–66.67	20
2022	3	9	200	50
2023	2	11	33.34	22.22
2024	1	12	–	–

Abbreviation: APC = Annual Paper count, CAPC = Cumulative Annual Paper count.

Keyword Frequency

Table 8 finds keywords used in his 12 papers and titles of the papers during 2019–2024. All keywords are grouped into three categories. Group I include two keywords, of which each has occurred 3 times; group II deals with seven key terms, each of which is used 2 times; and group III consists of 39 keywords, each has been used once.

Table 8. Keyword frequency.

Group	Keywords	Frequency	Total
I	Anthelmintic activity; Plant methanolic [02]	3 each	06
II	Bioinformatics Approaches; Indian adult earthworm; miRNA-Based Therapeutics; Peptide-based diagnostics; Acacia nilotica; Aqueous extract; In vitro phytochemical analysis [07]	2 each	14
III	Akanda; Antibacterial efficiency; Armenian WGS isolates; BetaCoronavirus; <i>Calotropis gigantea</i> L.; Calotropis gigantean; CDS Modulo 3; Clinical Measures; <i>Conspicuous scan</i> ; Covid-19; Dental pathogens; DNA barcoding; Epidemiology; Food regulations; HGVS-Protein Level Mutations; India; Inhibitor; In-vitro anthelmintic activity; Liver Cancer; Methanol extract; Microbiological assessment; miRNA; miRNA mimics; Omicron; Panskura block; Pathogenic bacteria; Pathogenicity; Personal hygiene; Pheretima posthuma; Phylogenetic Analysis; Phytochemical analysis; SARS-CoV-2; Spike protein; Street foods; Supportive services; Vaccine; West Bengal; Zika Virus; Toothpastes [39].	1 each	39
	<i>Total</i>		59

CONCLUSION

Due to his untired hardworking, this young scientist is going ahead with his ongoing scientific practice, and he is doing work for the benefit of humanity, providing scientific gifts and promising to give more in the future. His name will be engraved in the gold letters in the history of basic science as well as medical science globally. Where each year, only two or three researchers worldwide are chosen for the grant of *The Max Planck Institute*, USA, selection of Dr. Somenath Dutta is a great pride for the people of the country as well as West Bengal. *The Max Planck Institute* is celebrated for its research accomplishments and has affiliations with 39 Nobel laureates. That is not a matter of jock. It is also

notable that the 2024 Nobel Prize in Physiology or Medicine has been awarded jointly to the scientists Victor Ambros, and Gary Ruvkun for their groundbreaking discovery of “microRNA and its role in post-transcriptional gene regulation”. Somenath is deeply grateful to be working in the same field, hoping that their pioneering research has paved the way for his own contributions. He feels privileged to be part of this vital area of study. After gaining substantial global recognition for his work on “miRNA therapeutics for the Zika virus”, he finds it truly inspiring that the same approach has been honored with this year’s Nobel Prize. If vaccine is prepared in holding the hand of Somenath’s recent discovery, different zika virus diseases, including liver cancer may be cured in near future. This scientometric portrait is merely a token of appreciation and message of congratulation for the initial recognition of his remarkable discovery. May he find great success in his future pursuits.

Author Contributions

All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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