

## Transforming research landscapes: Multidisciplinary research unit, Shyam Shah Medical College success story

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### Abstract

The Multidisciplinary Research Unit (MRU) at Shyam Shah Medical College, Rewa, continues to play a pivotal and transformative role in advancing biomedical research, strengthening institutional research capacity, and promoting community-oriented public health initiatives. Since its establishment, the MRU has emerged as a dynamic platform that integrates clinical practice with laboratory-based research, thereby facilitating the generation of evidence that is both scientifically robust and clinically relevant. Through the successful implementation of diverse research projects, active participation in multi-centric collaborations, and the establishment of strategic partnerships with academic and research institutions, the MRU has significantly contributed to the development of a vibrant and multidisciplinary research ecosystem within the institution. The unit has also demonstrated a strong commitment to capacity building by organizing structured training programs, research methodology workshops, hands-on technical sessions, and academic seminars, which have enhanced the research skills and competencies of faculty members, students, and research scholars. These initiatives have not only improved the quality and quantity of research output but have also fostered a culture of innovation, critical thinking, and scientific inquiry. Furthermore, the MRU's engagement in community-based outreach activities, including disease awareness programs, screening camps, and public health interventions, reflects its dedication to translating research into meaningful health outcomes, particularly in underserved and high-risk populations. In addition, the MRU has contributed significantly to academic excellence through high-quality publications, conference presentations, and innovation-driven outputs such as patents, while also supporting institutional journals and mentoring young researchers. Its role during public health emergencies, including the COVID-19 pandemic, further highlights its capacity to respond effectively to emerging health challenges with technical expertise and scientific rigor.

**Keywords:** Biomedical research capacity building, Interdisciplinary collaboration, Multi-disciplinary research unit, Public health initiatives, Research productivity and innovation, Translational research

### 1. Introduction

The Multidisciplinary Research Unit at Shyam Shah Medical College (SSMC), Rewa, Madhya Pradesh established on 22 October 2014 and operationalized in 2017, serves as a state-of-the-art research platform dedicated to strengthening biomedical research and fostering interdisciplinary collaboration. Functioning under the aegis of the Department of Health Research (DHR), Government of India, the Multidisciplinary Research Unit (MRU) was conceptualized to bridge the gap between basic science and clinical practice by promoting high-quality, need-based, and translational research in priority health areas, particularly those relevant to central India. The unit provides advanced laboratory infrastructure, technical expertise, and a collaborative environment that enables faculty members, postgraduate students, and research scholars to undertake innovative and impactful research projects. The MRU plays a pivotal role in enhancing institutional research capacity by facilitating extramural funding opportunities, promoting multi-centric collaborations, and supporting the development of competitive research proposals. It actively encourages interdisciplinary research by integrating clinical departments with basic sciences, thereby generating evidence that can directly influence patient care, disease prevention strategies, and public health policies. The unit is also instrumental in mentoring young researchers and nurturing a culture of scientific inquiry through structured training programs, workshops, and hands-on skill development initiatives. In addition to academic and research contributions, the MRU significantly supports public health initiatives, including community-based screening programs, disease awareness campaigns, and advanced diagnostic services such as molecular testing and prenatal screening for genetic disorders. Its contributions

during public health emergencies, including the COVID-19 pandemic, highlight its capacity to respond effectively to emerging health challenges. With a vision to evolve as a center of excellence in biomedical research, the MRU at SSMC Rewa holds immense potential to generate high-impact scientific evidence, foster innovation, and contribute to national health priorities. By strengthening collaborations at regional, national, and international levels, and by translating research findings into clinical and community applications, the MRU is poised to play a transformative role in advancing healthcare outcomes and research excellence in the region.

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## 2. Governance and organizational structure

The Multidisciplinary Research Unit at SSMC, Rewa, operationalized during the tenure of Dr. P. C. Dwivedi, the then Chief Executive Officer and Dean, marking a significant step toward strengthening institutional research infrastructure. Since its establishment, the MRU has evolved under the dynamic leadership of a series of dedicated nodal officers, beginning with Dr. Jyoti Singh, followed by Dr. Sudhakar Dwivedi, Dr. Rahul Mishra, and Dr. Beenu Kushwah Singh, each contributing to the progressive development of the unit. Dr. Avatar Singh has also played an important role as Associate Nodal Officer, while the unit is currently being efficiently headed by Associate Nodal Officer Dr. Lokesh Tripathi, while the institute is headed by Dr. Sunil Agrawal. Furthermore, Dr. Shankhpani Mahapatra has provided valuable technical and academic support as Assistant Nodal Officer, strengthening the operational and research framework of the unit. The institutional governance of the MRU is well-structured and aligned with the guidelines of the DHR, Government of India. The Local Research Advisory Committee plays a central role in ensuring scientific rigor and quality by overseeing project selection, evaluation, and approval, with meetings conducted biannually to review progress and provide strategic direction. In addition, the Executive Committee is responsible for the overall implementation, monitoring, and administrative functioning of the MRU, conducting quarterly meetings to ensure the timely execution of activities, optimal utilization of resources, and adherence to institutional and national research priorities. The MRU is supported by a dedicated and skilled manpower structure that ensures smooth and efficient functioning of the center. This includes one Research Scientist-II (Scientist C) and one Research Scientist-I (Scientist B), who lead scientific activities and project execution, along with two trained laboratory technicians who manage advanced laboratory procedures and sample processing. A data entry operator supports data management, documentation, and reporting activities, ensuring accuracy and compliance with research standards. Together, this multidisciplinary team facilitates high-quality research, supports collaborative projects, and enhances the overall research output of the institution.

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## 3. Research projects portfolio

The Multidisciplinary Research Unit at SSMC, Rewa, has demonstrated remarkable growth in research activity since its inception, reflecting the development of a dynamic and multidisciplinary research ecosystem within the institution. A total of 25 research projects have been initiated to date, of which 11 have been successfully completed, demonstrating steady progress in project implementation, effective execution, and meaningful research outcomes. The unit has also actively contributed to 2 multi-centric research projects and conducted 1 clinical trial, highlighting its expanding collaborative network and growing capability in conducting advanced clinical research. Furthermore, eight projects have successfully secured extramural funding under various categories, including task force projects, research fellowships, and small extramural grants, underscoring the MRU's ability to attract competitive funding and support high-quality research across diverse domains. A wide range of clinical and preclinical departments have actively participated in MRU-supported research activities, including the Departments of Pediatrics, Dermatology, Urology, Orthopedics, General Surgery, Biochemistry, Pharmacology, Ophthalmology, Medicine, and Psychiatry. Among these, the Department of Pediatrics has demonstrated exceptional leadership by submitting the highest number of research proposals and successfully securing multiple research grants, thereby significantly contributing to the research output of the unit. In addition, several departments are actively engaged in doctoral (PhD) research programs in the medical field, further strengthening the academic and research environment of the institution. This strong interdepartmental collaboration, combined with increasing research engagement among faculty and scholars, highlights the MRU's potential to evolve into a center of excellence for multidisciplinary and translational research. The unit continues to foster innovation, promote evidence-based clinical practices, and generate impactful research outcomes that address regional and national health priorities.

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## 4. Research visibility and academic impact

MRU-supported research has resulted in substantial academic output, reflecting the growing research capacity, quality, and visibility of the unit. A total of 34 publications have been produced in indexed journals, including 10 publications in journals with an impact factor of 1–3 and two publications in journals with an impact factor of 3–5, demonstrating a steady progression toward higher-impact scientific contributions. The scholarly output spans a wide range of publication categories, including original research articles, review articles, case series, letters to the editor, book chapters, and conference/workshop proceedings,

indicating both depth and diversity in research dissemination. These publications highlight the multidisciplinary nature of the MRU and its commitment to addressing clinically relevant and region-specific health issues. In addition to academic publications, the unit has also achieved innovation outcomes, including one design patent developed in collaboration with a partner research institute, showcasing its translational research potential and emphasis on innovation. Collectively, these achievements underscore the MRU's emerging role as a hub for high-quality research, knowledge generation, and scientific contribution at both national and international levels, with strong potential for future advancements in impactful and policy-relevant research. The MRU at SSMC Rewa achieved research scores of 6 in 2023, and 8 each in 2024 and 2025 (out of a maximum of 10), as assessed by the DHR, New Delhi, indicating progressive improvement in research performance.

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### 5. Resource sharing and technical exchange

To strengthen collaborative research, foster interdisciplinary innovation, and promote effective knowledge exchange, the MRU has established three key research memoranda of understanding (MoUs) with reputed partner institutions, namely Government Veterinary College, Rewa; APS University, Rewa; and the Department of Biotechnology, Guru Ghasidas Vishwavidyalaya, Bilaspur. These strategic collaborations provide a robust platform for integrating expertise across medical, veterinary, and basic science domains, thereby significantly expanding the scope and quality of research activities. Through these MoUs, the MRU facilitates the exchange of technical expertise, faculty interactions, and specialized guidance in advanced research methodologies. They enable the development and execution of joint research projects, including interdisciplinary and multi-centric studies that address region-specific and nationally relevant health challenges. The partnerships also promote optimal utilization of shared resources, including laboratory infrastructure, diagnostic facilities, and specialized equipment, thereby enhancing research efficiency and cost-effectiveness. Furthermore, these collaborations play a crucial role in capacity building by supporting training programs, student exchanges, skill development workshops, and mentorship opportunities for young researchers and scholars. In addition, the MoUs encourage collaborative scientific publications, joint grant applications, and innovation-driven research outputs, thereby improving the visibility and impact of the institution at both national and international levels. These partnerships not only strengthen the multidisciplinary research ecosystem of the MRU but also position it as a growing hub for collaborative, translational, and impactful research. With continued expansion of such networks, the MRU holds significant potential to contribute to cutting-edge scientific advancements, policy-relevant research, and improved healthcare outcomes in the region and beyond.

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### 6. Capacity building initiatives

A total of seven capacity-building programs, including conferences and hands-on workshops, were systematically organized by the MRU to strengthen research aptitude, technical proficiency, and translational research capabilities among faculty members, clinicians, and students. These initiatives were designed to bridge the gap between theoretical knowledge and practical application, thereby fostering a robust research-oriented academic environment within the institution. Three dedicated research methodology workshops were conducted to enhance faculty competence in research design, protocol development, biostatistics, and scientific writing. Among these, one prestigious workshop was sponsored by the DHR in collaboration with the ICMR-CCoE Centre, Yenepoya University, Mangalore, which provided advanced insights into structured research planning and multi-centric collaboration. Another DHR-sponsored workshop focused specifically on project proposal writing for extramural funding, equipping participants with essential skills to develop competitive grant proposals. In addition, a major academic event included an MPCST-sponsored conference on Sickle Cell Disease, which served as an important platform for knowledge dissemination and discussion on regionally relevant genetic disorders. A specialized workshop supported by the Department of Public Health and Medical Education on Medical Certification of Cause of Death and ICD further strengthened participants' understanding of accurate mortality reporting and its public health implications. Complementing these, four hands-on training workshops were conducted to provide practical exposure to advanced diagnostic and clinical techniques. These included training in histo-technique for colorectal cancer diagnosis, enhancing pathological diagnostic skills; STEMI management and the STEMI-Act project for heart attack rescue, focusing on emergency cardiac care and timely intervention strategies; and reverse transcription polymerase chain reaction-based detection of vitiligo in correlation with heat shock proteins, introducing participants to molecular diagnostic approaches. Collectively, these programs have significantly improved technical competencies, research methodology skills, and interdisciplinary collaboration among participants. They have also contributed to increased research productivity, better quality of scientific outputs, and enhanced readiness for undertaking translational and clinically relevant research. Such sustained capacity-building efforts highlight the MRU's strong potential to emerge as a center of excellence for training, innovation, and impactful biomedical research at the regional and national levels.

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### 7. Skill development and technical competency enhancement

One of the core objectives of the MRU is to strengthen research capacity among students and faculty by providing a structured, resource-rich, and mentorship-driven environment. In this direction, a total of 28 trainees have been supported, including

3 PhD scholars, MSc. students, and 25 MBBS students through elective postings, reflecting active engagement at multiple academic levels. In addition, 4 Senior Research Fellows and 1 Junior Research Fellow have been trained under the unit, contributing to advanced research activities and project execution. These trainees have effectively utilized the state-of-the-art laboratory infrastructure and technical facilities available at the MRU, gaining hands-on experience in modern research techniques, data collection, analysis, and scientific documentation. The unit has also provided continuous mentorship, guidance in research methodology, proposal development, and scientific writing, enabling trainees to actively participate in ongoing projects and contribute to publications and presentations. Furthermore, exposure to multidisciplinary research environments has enhanced their critical thinking, problem-solving abilities, and understanding of translational research. Many trainees have been encouraged to pursue higher studies, competitive fellowships, and independent research careers, thereby creating a sustainable pipeline of skilled researchers. Overall, these capacity-building efforts have significantly strengthened the research culture within the institution and positioned the MRU as a key platform for nurturing future scientists and clinician-researchers with strong potential for national and international contributions.

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### 8. Community outreach initiatives

The MRU has implemented several innovative and community-oriented initiatives that significantly contribute to public health improvement, research dissemination, and community engagement. These efforts are aligned with regional health priorities and aim to translate research into real-world impact. One of the key initiatives includes school-level health awareness programs, particularly focusing on obesity prevention, where students are educated on healthy lifestyle practices, balanced nutrition, physical activity, and early risk identification. These programs not only raise awareness but also instill long-term behavioral changes among young populations, thereby contributing to the prevention of non-communicable diseases. In addition, the MRU has actively conducted specialized community-based sickle cell screening and awareness camps in tribal and high-risk areas such as the Dindori and Sidhi districts of Madhya Pradesh. These camps focus on early detection of sickle cell disease through screening programs, provision of genetic counseling to affected families, and dissemination of awareness regarding disease prevention and management. Such targeted interventions are particularly impactful in underserved populations, where access to diagnostic and counseling services is limited. These outreach activities have played a crucial role in addressing region-specific health challenges and supporting national programs aimed at controlling genetic disorders. Furthermore, the MRU has taken significant steps toward promoting research awareness and scientific curiosity by facilitating educational visits from students of various schools and colleges. These visits provide firsthand exposure to laboratory functioning, modern diagnostic techniques, and ongoing research activities, thereby motivating students to pursue careers in biomedical research and healthcare. Collectively, these initiatives demonstrate the MRU's strong commitment to community outreach, preventive healthcare, and knowledge dissemination. By integrating public health action with research activities, the MRU shows immense potential to serve as a model center for community-linked translational research, ultimately contributing to improved health outcomes and increased scientific awareness at both regional and national levels.

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### 9. Key achievements overview

Several noteworthy achievements were recorded during the reporting period, underscoring the growing research excellence, innovation capacity, and academic visibility of the MRU. The initiation of a clinical trial project represents a significant milestone, reflecting the unit's advancement toward high-quality clinical and translational research with direct relevance to patient care and evidence-based practice. Furthermore, two important research outcomes from the MRU were presented at prestigious international conferences held in Paris (France) and Florida (USA), highlighting global recognition and acceptance of the unit's scientific contributions. In addition to international exposure, multiple research findings were presented at various national conferences, facilitating knowledge dissemination, peer interaction, and academic networking. A notable achievement includes four MRU-affiliated scholars being awarded the Young Scientist Training Fellowship, which provided them with opportunities for advanced scientific training and skill enhancement at reputed institutions, thereby strengthening the future research workforce. The MRU has also attained recognition as a SIRO (DSIR) recognized laboratory, further validating its research infrastructure, quality standards, and capability to undertake advanced scientific and industrial research activities. The MRU has also played a proactive role in academic capacity building, with its scientists delivering specialized lectures and training sessions to MMLT students, promoting research-oriented education and bridging the gap between laboratory science and clinical application. Importantly, the unit has achieved innovation-driven success through the grant of one design patent in collaboration with partner research institutions, reflecting its commitment to translational research and development of novel solutions. Collectively, these accomplishments demonstrate the MRU's strong potential to emerge as a leading center of excellence in biomedical research, with increasing contributions to high-impact science, innovation, and capacity building at both national and international levels.

## 10. Impact on institutional growth and excellence

MRU scientists have made substantial and multidimensional institutional contributions, significantly strengthening both clinical services and academic excellence within SSMC, Rewa. One of the key contributions includes providing advanced laboratory support for the prenatal diagnosis of sickle cell disease at the Birsa Munda Centre for Excellence, thereby enhancing the institution's capacity for early detection, genetic counseling, and prevention of hereditary disorders. This has had a direct impact on improving patient care and supporting national health priorities related to the control of sickle cell disease, particularly in high-prevalence regions. In addition to clinical support, MRU scientists have played a crucial role in advancing the academic and research environment of the institution. The team has actively contributed to the strengthening of the institutional VJMR Journal through manuscript preparation, scientific writing support, peer-review facilitation, and mentoring of young authors, thereby promoting a culture of quality research publication and academic integrity. Their involvement has helped improve the standard, visibility, and indexing potential of institutional research outputs. Furthermore, MRU scientists demonstrated exceptional commitment and responsiveness during the COVID-19 pandemic by contributing extensively to diagnostic and laboratory services. They provided technical expertise in sample processing, testing protocols, quality assurance, and data management, thereby supporting timely diagnosis and effective pandemic response. Their role not only strengthened institutional preparedness during a public health emergency but also highlighted the importance of a well-equipped research unit in crisis situations. Beyond these contributions, MRU scientists continue to support interdisciplinary collaborations, capacity-building initiatives, and translational research activities within the institution. Their efforts in mentoring students, guiding research projects, and facilitating advanced laboratory techniques have significantly enriched the research ecosystem. Collectively, these contributions underscore the MRU's strong potential to function as a center of excellence, driving innovation, enhancing clinical outcomes, and promoting high-impact academic and public health research at regional, national, and international levels.

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## 11. Impact on institutional research culture

The MRU has played a pivotal and proactive role in promoting research development within the institution through a well-structured framework of academic programs, capacity-building initiatives, and continuous mentorship. It has effectively sensitized various clinical and non-clinical departments to actively participate in research and development activities, encouraging faculty members to identify priority research areas and apply for competitive intramural and extramural research grants. As a result, there has been a noticeable increase in research engagement, particularly among young and early-career faculty, who are now showing greater interest and confidence in undertaking independent and collaborative research projects. To further strengthen research competencies, the MRU has regularly organized research methodology workshops, hands-on training programs, scientific seminars, and interactive sessions focusing on study design, biostatistics, proposal writing, ethical considerations, and scientific communication. These structured interventions have significantly enhanced the technical skills, analytical abilities, and scientific writing capacity of participants. The emphasis on practical training and real-time problem-solving has helped bridge the gap between theoretical knowledge and research implementation. These sustained efforts have translated into measurable academic outcomes, including a steady rise in high-quality research publications in reputed national and international indexed journals. The unit has contributed to a diverse range of scholarly outputs, such as original research articles, review papers, case reports, and letters to the editor, reflecting both the depth and breadth of research activities. In addition, there has been increased participation in conferences, collaborative projects, and interdisciplinary research initiatives. Overall, the MRU has emerged as a central driving force in cultivating a vibrant research culture within the institution. By continuously nurturing innovation, supporting young researchers, and facilitating high-impact scientific output, the unit demonstrates strong potential to evolve into a center of excellence for biomedical and translational research, contributing significantly to evidence-based healthcare and national research priorities.

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## 12. Conclusion

With a strong foundation in research infrastructure, experienced leadership, and a growing network of collaborations, the MRU at SSMC Rewa holds immense potential to evolve into a center of excellence in biomedical and translational research. By continuing to foster interdisciplinary collaborations, attract competitive funding, and prioritize region-specific and nationally relevant health issues, the MRU is well-positioned to generate high-impact scientific evidence and innovative healthcare solutions. Sustained institutional support and strategic partnerships at national and international levels will further enable the unit to expand its research footprint, influence policy and clinical practice, and contribute meaningfully to improving public health outcomes and advancing the frontiers of medical science.

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### 13. Acknowledgments

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### 14. Conflicts of interest

None.

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