

Research activities of undergraduate medical students: Hurdles and the way forward—A graduate's perspective

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There are many examples of noteworthy contributions by medical students. However, the uptake of undergraduate (UG) research opportunities in India is disappointing, and little is known about the hurdles faced by students in undertaking research activities. I provide my perspective of the scope, hurdles and possible solutions to pursuing research by medical UG students.

As an eager medical student, I was driven to ensure that I made the best of my time on the college campus. In the first year, the bulky *Textbook of medical physiology* by Guyton and Hall often raised a doubt, 'Where did all this knowledge and data come from?' The answer which lay in the 'Bibliography' soon led me towards the world of evidence-based medicine and medical research. I recollect my early days of graduation when research was synonymous with brownie points for aspirants of the American foreign medical graduate examinations. However, somewhere in the race to earn these, students forgot to savour the brownie.

Jay McLean's discovery of heparin, Paul Langerhans' description of pancreatic islets and Martin Flack's discovery of the sinoatrial node are indeed inspirational for UG students.¹ Research helps students to not only better understand their academic syllabus but also gives them a chance to delve deeper in subjects of their interest and get a glimpse of what that field has to offer, helping them to make an informed decision about their careers. Early research exposure also leads to improvement in postgraduate research.² However, few medical students in India are involved in good research projects. The reasons for this have not been studied.³ Having realized all that the world of research had to offer, I wondered why an institute like mine, which produced so many quality publications, had so few UG students involved in the same.

The idea of research was perceived by many students as interesting, but what stopped them from actually indulging in it was 'How does one start?' Those who did start seldom remained with the project till the end and abysmally few eventually co-authored the publication. This attrition was fuelled by numerous factors including lack of right mentorship, conflict with mainstream course work or simply loss of interest! The lengthy process and bureaucratic red tape of the institutional ethics committee (IEC) submission and approval process further

worsen the dropout rate.⁴ All these factors hamper the research participation of UG students.

Medical conferences where students could present their studies as research papers, posters or medical symposia are added benefits of being a part of the research project. It gives an opportunity to students to not just showcase their work, but simultaneously hone their public speaking skills and also witness the kind of projects their peers are pursuing. Scholarships such as the 'Short-Term Studentship' of the Indian Council of Medical Research (ICMR) stimulate students, but there is a high dropout if the project is not selected for the scholarship, which further discourages faculty from mentoring UG researchers in the first place.

For many already overworked academicians, allocation of time to guide young researchers seems to be an unnecessary burden, leaving the excited students no option but to abandon the idea of research altogether. The UG medical curriculum lacks modules on practical aspects of research such as literature search using PubMed or statistical analysis using the statistical package for social sciences (SPSS) software. The research methodology workshops at various conferences and existing online research methodology courses are structured according to the postgraduate curriculum and do not take into account the perspective of a UG student. This has led to academic research becoming an extra-curricular rather than a co-curricular activity—students had to learn everything on their own, beyond their already hectic schedule. The incorporation of research electives in the Competency-based Medical Education curriculum gives a glimmer of hope. In addition to not getting involved in core research, medical students also lack the skills of reading/critically appraising an article. This is reflected in the limited number of academic resources students refer to during their formative years of medical education. This prevents them from developing an evidence-based approach, which is necessary for a practising doctor.

The Covid-19 pandemic has been an eye opener for us regarding the importance of research and evidence-based medicine. Having realized the potential, scope and the spectrum of opportunities that an early exposure to research can provide, it is the collective responsibility of senior members of the medical fraternity to guide and nurture young inquisitive minds so that they can widen their horizons and explore the nuances of research.

'If you are going to try, go all the way. Otherwise, do not even start.' This quote by Charles Bukowski holds true in the context of research as well. All the work would be of no use if it does not supplement the existing medical literature. The National Ethical Guidelines for Biomedical and Health Research state that it is the ethical duty of researchers to publish their findings in the public

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domain for the benefit of all.⁵ Medical Student Journals or MSJs (entirely student-led periodicals that publish student-authored articles) or manuscript types such as *Student IJMR* launched by the ICMR have aimed to boost the authorship of UG students in research publications; however, MSJs have characteristically been known to employ a student-friendly and feeble peer-review process, which is often associated with poor quality of published articles.⁶ The *Journal of Postgraduate Medicine* has introduced a 'student-friendly contribution corner' to specifically solicit research submissions from young medical students,⁷ and these submissions undergo a thorough peer review. Such initiatives would go a long way in improving the quantity and quality of research by UG students (Table I).

At the institutional level too, multiple measures can be undertaken to boost student participation in research activities. A few of the activities we initiated in our college are mentioned below. These have been in operation at our college for 2 years and the results have been promising. We have worked not only to make UG students realize the importance of research but have also made arrangements for guidance to students at each and every phase of their research projects. Through this article, I wish to encourage other medical colleges to take up the following initiatives, which have been successfully introduced at our college, so as to help students pursue quality research projects:

1. *Research database*: We maintain a single up-to-date compilation of the research currently in progress at the institute and the vacancies for UG students so that they could be a part of research projects of their interest.
2. *Journal club*: Sessions are organized for UG students to help them understand the different components and analysis of research articles and study designs. This will enable them to better comprehend and critique published medical literature.
3. *Interdepartmental coordination and collaboration*: We approached various departments of the college to support research activities of students as a part of the pre-clinical and paraclinical electives as mandated by the competency-based medical education curriculum.
4. *Research consultation services*: With the help of research experts at the institution, we organize *Research Consultation Outpatient Departments* for guidance on specific aspects of research methodology concerning a particular research activity for UG students of the college.
5. *Research workshops*: We have organized various workshops in collaboration with faculty members from the department of community medicine on designing and validating questionnaires and conducting community-based research studies.
6. *Interactive sessions*: Informal talks have been organized by experienced faculty members to make young students understand the contribution of research to policy guidelines; eventually translating into practice through standard treatment guidelines or national health programmes.
7. *Institutional Ethics Committee*: We conducted sessions to provide guidance on drafting a proposal and informed consent to ease the permission process for the research studies of UG students.
8. *Educational visits*: Tours to various laboratories and departments of the college to orient and stimulate the young minds in paraclinical research studies such as the Biochemistry and Microbiology laboratories, Pharmacology practical experiment centre, Animal house for animal-based

TABLE I. Opportunities, hurdles and solutions for undergraduate medical research

<i>Opportunities</i>
Operational research activities and projects
Publications to strengthen one's academic profile
Participation in paper and poster presentations
Organizational and oratory skills
Research careers
Travel grants
Understanding medical literature
Networking prospects
Innovations in biomedical devices
Team up with different streams and professions
International research exchange programmes
Exposure to different medical and surgical specialties
Symposia and social skills
<i>Hurdles</i>
High student drop-out
Undergraduate curriculum lacking research education
Research conflicting with time for academics
Doing research only for foreign medical graduate examination
Low-quality predatory journals
Ethics committee permission process
Structured institutional framework missing
<i>Solutions</i>
Sessions of journal club for students
Organize student research councils
Launch a real-time research database
Undergraduate curriculum including research
Tours to laboratories and animal house
Interdepartmental collaborations
OPDs for research consultation services
New student-friendly types of manuscripts
Strengthening existing institutional research framework to include undergraduates

research studies and Ayurveda research centre were arranged.

9. *Research sessions*: We organized sessions on medical research writing and analysis, understanding various types of media (poster, paper and symposia) and platforms (conferences) for presenting their studies, hands-on workshops on the use of search engines such as PubMed and software such as SPSS for statistical analysis.

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