

## Research in undergraduate medical students

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### Abstract

Undergraduate medical research aims at developing interest and competencies related to scholarly research to the budding future physicians. The perception and attitude of students towards research is one of the most important factor in determining the ratio of physician–scientists in the society. Hence it is important to tap this untapped potential and expose the undergraduates at an earlier stage in their careers to the basics of medical research. This will not only help in improving knowledge but will also improve their skills in searching and critically appraising medical literature, independent learning and writing.

**Keywords:** Medical Research, Undergraduate, Curriculum, Attitude.

Research is considered to be the cornerstone of advancement not only in medicine but also in technology. In the present scenario, one of the measures of scientific progress of the country is the research carried out and its impact at the community level.<sup>(1)</sup> Life-long learning beyond baseline education among students and educators is the hallmark for the future careers and hence incorporating research education into a curriculum, may be one of the method to prepare graduates to enter their profession.

By definition, research at the undergraduate level is the exploration of a specific topic within a field by an undergraduate student that makes an original contribution to the discipline.<sup>(2)</sup> Although, literature suggest that undergraduate students are unfamiliar with fundamental aspects of biomedical literature.<sup>(3)</sup> Medical students regularly engage in curricular and extracurricular activities, including undergraduate research.

Undergraduate medical research needs to be complemented along with student curriculum. Exposing undergraduates to the basics of medical research, an earlier stage in their careers will help in improvement twofold i.e. increase in knowledge and attitudes toward research and secondly skills of searching and critically appraising medical literature along with independent learning and writing.<sup>(4)</sup> Moreover research will broaden students' scientific training helping them to pursue their careers in academic medicine.<sup>(5)</sup>

The most important aspect related to research in under-graduation is that it will help to reduce the gap between the information available and comprehension by the student making them feel confident and competent when they are performing tasks in their future career.<sup>(6)</sup> Many admissions boards for medical schools look for research experience when admitting students at the post graduate level. Also, the results of undergraduate research can be published in peer-reviewed journals. Research with publication also has a positive influence on the advancement of the students'

career regarding promotion, salary, academic recognition and scientific reputation.<sup>(3)</sup>

Griffin MF<sup>(5)</sup> in his study has suggested that research is not new to some students. Seimans<sup>(6)</sup> was of the opinion that students having experience with research prior to medical school were associated with a greater likelihood of pursuing research as a medical student. Now a days, research projects aiming to enhance teaching and learning in medical education go hand in hand with advancing theories and knowledge in the field of medicine. The modern era is based on the triad which involves teaching, research and outreach activities along with its application to medical training to basic or clinical science.<sup>(1,9,10)</sup>

Research opportunities should not be limited to only to the academic institution. In India, research universities (and other types of institutions) offer research programs like Indian Council of medical Research (ICMR), **Kishore Vaigyanik Protsahan Yojana (KYPY)** etc. that are open to outside students.

Research projects are conducted under the guidance of a faculty mentor which may or may not be related to the mentor's scholarly work, particularly in the sciences. In case the research project is independent of mentor then the mentor helps by providing guidance in the methodology and ideas of the field. In either way, as students advance through research projects, they will become more independent scholars with an intellectual ownership of the work carried out. The research could be either clinical or educational research. Clinical research is a branch of healthcare science that determines the safety and effectiveness (efficacy) of medications, devices, diagnostic products and treatment regimens intended for human use. These may be used for prevention, treatment, diagnosis or for relieving symptoms of a disease. Educational research deals with the process and outcome of medical education. It involves knowledge and understanding of learning, teaching and education.

However the basic question which arises is regarding the appropriate time for the students to do a research project? Undergraduate medical students take a “biostatistics” class in their second and fourth semester by which they have already finished their basics in anatomy, physiology, biochemistry and histology. Also, the usage of electronic databases such as MEDLINE, grows as the students were further in the curriculum. This indicates that databases are more relevant for the students towards the end of their studies. It is necessary to help the students visualize the relevance of evidence based medicine, research and clinical practice prior to begin clinical rotations and thus this could be the appropriate time for inclusion of research into clinical practice.

Every research needs to have some degree of knowledge about the topic to be studied. Better knowledge about a topic could identify where research is lacking and allow creating more relevant hypothesis. With this in mind, medical students can acquire the ability to create hypothesis while they are on their clinical rotations. Once the imagination of new hypothesis has been inculcated then framing of the methodological foundation to do research becomes easier. Hence the first step for intervention in research at the undergraduate level is awareness, i.e. students need to be aware of what a hypothesis is and how it can trigger research.

The three main factors which contribute to the impact of research success in students are: knowledge of, attitude to and barriers toward research. Adequate knowledge of the study subject and awareness of research principles are essential prerequisites for any study.

With a remarkable decline in the number of physician-scientists, there is a downfall in the association of scientific discovery to clinical practice.<sup>(8)</sup> One of the factors precipitating this is the lack of interest in research among medical students.<sup>(11,12)</sup> Khan H<sup>(13)</sup> and Amit T<sup>(14)</sup> in their studies have demonstrated that though students had interest in pursuing research they had inadequate knowledge of the scientific process.

There are two sides of the coin and students tend to have positive and negative attitude regarding research during their undergraduate career.

The awareness of usefulness of research at the undergraduate level and the quantum, quality and benefits of ICMR research projects has made a huge positive paradigm shift in the attitude of undergraduate students towards research.

The students’ negative attitudes towards research include the difficulty of research, the number of workloads, anxiety towards the subject, perceived lack of training and time and opportunities<sup>(15-17)</sup> lack of mentorship and inadequate training in literature searches and research methodology, inadequate knowledge of study design or interpretation of the results<sup>(17)</sup> restrictions in funding support,<sup>(18,19)</sup> lack of research

training, lack of self-efficacy in performing research appropriate mentorship<sup>(20-21)</sup> lack of interest in research<sup>(22-23)</sup> and limited access to data sources (i.e. internet), materials and equipment.<sup>(14)</sup>

These difficulties need to be converted into beneficial effects so that research at the undergraduate levels is pursued since the benefits of research cannot be undermined. Hence, recommendations which can be undertaken to improve student attitudes to research include: encourage students to get involved in voluntary, extracurricular research; improve training in research methodology, which should include training on how to present at a scientific meeting, as well as on writing up and submitting a paper for publication; ensure that there is enough time in the curriculum allocated to pursue voluntary research interest; and enable greater access to research opportunities through finding/generating suitable projects, making students aware of these and helping them engage in the research process.

Lastly, one of the important aspects that educational activities can facilitate is the integration of research education into existing programs.

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