DOI: 10.7860/JCDR/2014/10223.5291

Original Article

Education Section

Medical Students' Research – Facilitators and Barriers

B UNNIKRISHNAN[1], TANUJ KANCHAN[2], RAMESH HOLLA[3], NITHIN KUMAR[4], T REKHA[5], PRASANNA MITHRA[6], VAMAN KULKARNI[7], B RESHMI[8]

ABSTRACT

Background: Undergraduate research in medicine is important to expose and encourage the students towards the newer advances and research practices. The present study was taken up in a medical institute to assess the perception of the medical faculty about research undertaken by the medical undergraduates, and identifying the barriers faced by them in training undergraduate students for research.

Materials and Methods: A questionnaire on perceptions, barriers and limitations towards undergraduate research was distributed to 105 participants included in the study. The responses of the participants were collected on a five point Likert scale and analysed using spss version 11.5.

Results: There was a strong agreement among the faculty about students' interest in carrying out research (95.1%), and that they had gained knowledge to design, conduct, present and publish their research from the projects undertaken by them (90.2%). Among the barriers for training undergraduate research, time consumption was perceived as a barrier by the participating medical teachers (37.7%) followed by lack of motivation and commitment among students (19.7%). Time constraint was the commonest reason for the faculty in not guiding undergraduate research (39.0%). A larger proportion of medical teachers suggested that incentives for students and teachers (62.7%) and frequent workshops for students related to undergraduate research (61.8%) are likely to encourage the students and teachers and thus, improve the scenario.

Conclusion: It is suggested to address certain important issues like reducing the workload of faculty engaged in undergraduate research, and conducting frequent research methodology workshops for the under graduate students to improvise the standards of undergraduate research.

Keywords: Barriers, Medical teacher, Perceptions, Undergraduate research

INTRODUCTION

Research is a systematic work undertaken to describe, explain, predict and control the observed phenomenon [1]. A good research enhances the knowledge, and the acquired knowledge may be applied to develop new applications and strategies. Research at the undergraduate level, is self-directed work under the guidance and supervision of a mentor/advisor [2]. Undergraduate research promotes student judgment and encourages students to make an understanding for what they learn. It helps in the transition of students from novice to expert learners [3]. Many medical schools/ colleges thus, give due attention to under graduate research. A few colleges have even made it mandatory for undergraduate students to undertake research under the guidance of the medical faculty.

Although much research has been done on the experiences of the students in conducting research [4-7], the perception of the faculty members on undergraduate research have not been studied in detail. The present study was taken up with the objectives of assessing the perceptions of the medical teachers about research undertaken by the medical undergraduates, and identifying the barriers they face in training undergraduate students for research. The study is thus aimed to report the facilitators and barriers of medical students' research as perceived by the medical teachers.

MATERIALS AND METHODS

The present cross-sectional research was conducted at Kasturba Medical College (KMC), Mangalore (A Constituent College of Manipal University), India. An approval was obtained from the Institutional Ethics Committee of KMC, Mangalore prior to conducting the study.

The sample size was calculated assuming that 50% of the teaching faculty at KMC, Mangalore was involved in guiding undergraduate medical students for research. Taking an absolute precision of 10% and confidence interval of 95% the sample size was calculated to be 96. Adding 10% as non-response error, final sample size was taken as 105. The study was undertaken during July and August, 2013. Medical teachers working as faculty in KMC with an experience of more than one year were approached individually and explained about the objectives of the study. A written informed consent was taken from those who were willing to participate. Medical teachers were enrolled in the study based on convenient sampling. The data was collected using a pre tested, semi structured questionnaire. The questionnaire was divided into sections to collect the information pertaining to the participants in general, and their perceptions, barriers and limitations towards undergraduate research. The questionnaire was distributed to 105 participants included in the study.

The responses of the participants regarding their perceptions about research undertaken by medical undergraduates were collected on a five point Likert scale. The responses to the Likert-type items were graded using a differential scaling system; from 1 (strongly disagree) to 5 (strongly agree) for the positive items, and from 1 (strongly agree) to 5 (strongly disagree) for the negative items. The questionnaires with responses were subsequently collected and assessed for completeness. Only the completed questionnaires (n=102) were considered for further analysis. Among the completed questionnaires received from the study participants, 61 medical teachers had guided undergraduates for medical research while the remaining 41 had never guided undergraduate research. The medical teachers who had guided undergraduate research (n=61) responded for the items relating their assessment, benefits and the barriers of undergraduate research, while the others (n=41) were asked about their perceptions/ reasons for not guiding undergraduate research.

Faculty assessment of undergraduate research	Agree N (%)	Not sure N (%)	Disagree N (%)	Mean Likert score (S.D.)
Students are generally interested in research	58 (95.1)	02 (03.3)	01 (01.6)	4.3 (0.6)
Students learnt critical thinking skills	49 (80.3)	12 (19.7)	00 (--)	4.1 (0.7)
Students had a clear understanding of methods and practices of research	42 (68.9)	18 (29.5)	01 (01.6)	3.8 (0.7)
Student gained knowledge to design, conduct, present and publish their research	55 (90.2)	03 (04.9)	03 (04.9)	4.2 (0.7)

[Table/Fig-1]: Faculty assessment of undergraduate medical student's research projects (n=61), *1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree, S.D. – Standard Deviation*

Benefits of undergraduate research	Agree N (%)	Not sure N (%)	Disagree N (%)	Mean Likert score (S.D.)
Teachers get an opportunity to work with students	53 (86.9)	07 (11.5)	01 (01.6)	4.4 (0.7)
Students bring new ideas for research	37 (60.7)	20 (32.7)	04 (06.6)	3.7 (0.8)
Undergraduate research is viewed positively for merit/annual review	34 (55.7)	19 (31.2)	08 (13.1)	3.6 (0.9)
Gives credit towards tenure & /or promotion	16 (26.2)	33 (54.1)	12 (19.7)	3.1 (0.9)
Help students in further research studies	45 (73.8)	13 (21.3)	03 (04.9)	3.9 (0.7)
Help students for better work experiences	52 (85.2)	09 (14.8)	00 (--)	4.1 (0.6)
Enjoy teaching students about research	56 (91.8)	04 (06.6)	01 (01.6)	4.4 (0.7)
Increase in number of publications	31 (50.8)	26 (42.6)	04 (06.6)	3.7 (0.9)
Presentation of research in conferences	18 (29.5)	13 (21.3)	30 (49.2)	2.8 (1.3)

[Table/Fig-2]: Benefits of undergraduate research as perceived by the faculty (n=61), *1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree, S.D. – Standard Deviation*

All the participants (n=102) had given suggestions for improvising undergraduate research.

The collected data was analysed using SPSS (Statistical Package for Social Sciences) version 11.5 and the results obtained were expressed in proportions. Mean Likert score was calculated for each item based on the responses of the participants. The overall agreements and disagreements are expressed in percentages. The agreement of the participants constituted of grades 4 and 5 together for the positive items and grades 1 and 2 together for the negative items. Likewise, disagreement for each item was taken as grades 1 and 2 together for the positive items and grades 4 and 5 together for the negative items. Grade 3 as a response signified that the participants were not sure for a particular item.

RESULTS

A total of 102 medical teachers participated in the study. The majority of the faculty who were recruited into the study were less than 40 y of age (n=58, 56.9%), and more than half of the study participants (n=56, 54.9%) were females. More than three fourth of the study participants (n=82, 80.4%) possessed medical degrees while the others (n=20, 19.6%) were PhDs. The representation from the clinical departments was maximum (n=45, 44.1%), followed by preclinical (n=29, 28.4%) and paraclinical departments (n=28, 27.5%). More than half of the faculty (n=61, 59.8%) had guided undergraduate research at least once previously, while the others (n=41, 40.2%) had never guided the undergraduate medical students.

A total of 101 research projects were completed by the students under the guidance of medical teachers who participated in the study. More than half of the projects that were taken up by the undergraduate medical students (n=55, 54.5%), were Indian

Barriers for training research	Agree N (%)	Not sure N (%)	Disagree N (%)	Mean Likert score (S.D.)
Not valued by college	05 (08.2)	11 (18.0)	45 (73.8)	4.1 (0.1)
Not valued by department	03 (04.9)	11 (18.0)	47 (77.1)	4.1 (0.8)
Not valued by colleagues	06 (09.8)	14 (22.9)	41 (67.3)	3.8 (0.9)
Research quality is low	04 (06.6)	14 (22.9)	43 (70.5)	3.8 (0.8)
Research is not completed frequently	10 (16.4)	10 (16.4)	41 (67.2)	3.6 (0.9)
Lack of motivation and commitment	12 (19.7)	14 (22.9)	35 (57.4)	3.5 (1.0)
Time consuming	23 (37.7)	07 (11.5)	31 (50.8)	3.1 (1.1)

[Table/Fig-3]: Barriers for training undergraduate research as perceived by the faculty (n=61), *5=Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree, 1=Strongly agree, S.D. – Standard Deviation*

Reasons for not guiding undergraduate research	Respondents (%)
Limited/no time to guide a project for undergraduate medical students	16 (39.0%)
Students had limited/or no research training	09 (21.9%)
More interested in working with postgraduate students or any other faculty	09 (21.9%)
Students have had limited/no experience and /or skills	07 (17.1%)
Students have not been as committed as I need/expect them to be	05 (12.2%)
Project or area of research is not appropriate for undergraduate students	04 (09.8%)
Limited/no resources available to support undergraduate students	03 (07.3%)
Others	09(21.9%)

[Table/Fig-4]: Reasons for not guiding undergraduate research as perceived by the faculty (n=41)

Suggestions for improving research	Agree N (%)	Not sure N (%)	Disagree N (%)	Mean Likert score (S.D.)
Increase research funding	41 (40.2)	44 (43.1)	17 (16.7)	3.6 (1.2)
Incentives for students and teachers	64 (62.7)	28 (27.5)	10 (09.8)	3.9 (1.1)
Research related workshops for faculty	53 (51.9)	34 (33.3)	15 (14.8)	3.6 (1.2)
Research related workshops for students	63 (61.8)	31 (30.4)	08 (07.8)	3.9 (1.1)
Additional hours for supervising research	34 (33.3)	43 (42.2)	25 (24.5)	3.2 (1.2)

[Table/Fig-5]: Suggestions given by the faculty for improvising undergraduate research (n=102)., *1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree, S.D. – Standard Deviation*

Council of Medical research (ICMR) supported studentship (STS) projects followed by other non-funded research projects (n=28, 27.7%) and Manipal University funded research projects (n=18, 17.8%). Forty four projects were presented in various conferences, and 20 presentations (45.5%) received awards. The majority of the study participants (n=25, 40.9%) devoted 1 to 5 h in a wk on undergraduate research, followed by more than 20 h per wk (n=16, 26.2%), 6 to 10 h per wk (n=11, 18.0%) and 11 to 15 h per wk (n=06, 9.8%) and 16 to 20 h (n=03, 4.9%).

There was a strong agreement among the medical teachers about students' interest in carrying out research (95.1%), and that they had gained knowledge to design, conduct, present and publish their research from the projects undertaken by them (90.2%). The participants (68.9%) agreed that students had a clear understanding about the methods and practices of research. However, a good proportion of the participants (29.5%) were not sure of the same [Table/Fig-1].

Regarding the benefits of undergraduate research, a large proportion of the medical faculty agreed that they got opportunity to work with students (86.9%) and that they enjoyed teaching them about research (91.8%). The participants strongly agreed that undergraduate

research activities help the students for better work experiences (85.2%). There was a neutral reaction regarding its benefits in their promotions. The larger proportion of the faculty disagreed regarding the benefits in terms of presenting undergraduate research in conferences (49.2%), and more than half of the participants (54.1%) were not sure if it gives any credit towards faculty promotions. The benefits of undergraduate research as perceived by the faculty are shown in [Table/Fig-2].

Among the possible barriers, more than half of the participants did not recognize any particular barrier in undergraduate research [Table/Fig-3]. Time spent on undergraduate research was perceived as a barrier by a proportionately larger number of participants (37.7%), followed by lack of motivation and commitment (19.7%) and non-completion of research by the students (16.4%). The faculty disagreed that undergraduate medical research was not valued by the college, respective departments or colleagues. The faculty disagreed that the undergraduate researches were of low quality (70.5%).

The faculty who had never guided the undergraduate students gave multiple reasons for not guiding undergraduate research [Table/Fig-4]. Time constraint was cited as the most common reason for not guiding undergraduate research (39.0%). The faculty felt that the students had limited/ no research training (21.9%) and that they were more interested to work with postgraduate students or other faculty members rather than working with undergraduates (21.9%).

A large proportion of the medical teachers (59.8%) recommended that undergraduate research must be incorporated in the undergraduate medical curriculum. Most of the faculty agreed that for improvising undergraduate research, there must be incentives for both undergraduate students as well as teachers guiding them (62.7%). The faculty felt that workshops should be frequently conducted for the undergraduate students on various aspects of research (61.8%). Workshops should be conducted likewise for the faculty members regarding research methods and good mentoring practices (51.9%). A proportionately larger number of faculty were not sure if increased funding for undergraduate research assignment (43.1%) and allotment of additional hours not interfering with the day to day work schedule for supervising the undergraduate research (42.2%) could help improve undergraduate research. The suggestions given by the faculty for improvising undergraduate research are shown in [Table/Fig-5].

DISCUSSION

The present study has shown involvement of more than half of the faculty in training undergraduates in medical research, which is similar to that reported from a study done at University of Georgia [8] where 56.3% of the members had worked with students for undergraduate research. The majority of the undergraduate student research guided by the faculty in our study was ICMR-STS (Indian Council of Medical Research–Short Term Studentship) projects. ICMR-STS projects are a step taken by the ICMR to promote research among undergraduate medical students in India.

In the present investigation, nearly 40% of the participants had spent 1-5 h/ wk on student's research. The faculty felt that they could not spend more time on students' research owing to their busy work schedule, involvement in teaching as well as clinical work. Time spent on students' research in our study was more than that reported in a study conducted in University of Delaware [9], where the majority of the participants (90%) had spent 1-5 h/wk on undergraduate research. The medical teachers in our research strongly agreed that students can relate well to different backgrounds and work as a team during research projects which is similar to the studies conducted by Cox and Andriot [10] and Zydney et al., [11]. We observed that skills gained by the students such as critical thinking and data entry were similar to gains found in other studies by Cox and Andriot [10], Kardash [12] and Lopatto [13].

Our study observed that the major barrier for the faculty in guiding undergraduate research was that these researches are too time consuming which is consistent with previous studies by Brown [14], Zydney et al., [11] and Perez [15]. Another common barrier was that the students were underprepared for research which is similar to studies done by Bowman and Stage [16] and Chopin [17]. Though the faculty members had neutral opinion regarding the facilities provided for undergraduate research, they strongly favoured more incentives for both undergraduates and medical teachers guiding them.

As per Howles et al., [18], the students help the faculty think outside the box and bring about fresh perspective for research on new topics. Similar observations are made by the study participants in the present study. Cox and Audinot [10] reported that more the time spent by the faculty with the students the better was the quality of eventual research. Similar observations are made in our study with the faculty agreeing on this relation between time spent and quality of research. Most of the faculty members were in favour of frequent conduction of workshops related to undergraduate research.

The study highlights on the facilitators and barriers of undergraduate medical research as perceived by the medical teachers. Undergraduate research in medicine not only improves students' learning and skills but also benefits the faculty, institutions, and the society at large. It is suggested to address certain important issues like reducing the workload of faculty engaged in undergraduate research, and conducting frequent research methodology workshops for the under graduate students to improvise the standards of undergraduate research. Undergraduate medical students need to be encouraged to carry out research for early development of research aptitude and skills. This certainly requires able guidance from their teachers. Hence, the perceptions of medical teachers on undergraduate research in different settings need to be studied and the related issues be addressed accordingly for producing effective research atmosphere and good quality research.

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PARTICULARS OF CONTRIBUTORS:
1. Professor and Head, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
2. Associate Professor, Department of Forensic Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
3. Assistant Professor, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
4. Associate Professor, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
5. Associate Professor, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
6. Associate Professor, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
7. Assistant Professor, Department of Community Medicine, Kasturba Medical College (A Constituent College of Manipal University), Mangalore, India.
8. Associate Professor, Department of Health Information Management, SOAHS, Manipal University, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Tanuj Kanchan,
Associate Professor, Department of Forensic Medicine,
Kasturba Medical College, LHH Road, Mangalore – 575 001, Karnataka, India.
Phone : 9448252394, Fax : +91 824 2428183, E-mail : tanujkanchan@yahoo.co.in, tanuj.kanchan@manipal.edu

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jun 06, 2014**
Date of Peer Review: **Aug 08, 2014**
Date of Acceptance: **Sep 05, 2014**
Date of Publishing: **Dec 05, 2014**