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Original Research Article

Conventional Teaching Versus Telemedicine Assisted Teaching among Post Graduate Medical Students of Physiology Department in A Rural Medical College of West Bengal: A Pilot Study

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ABSTRACT

Background: Tele-education is an appropriate teaching methodology. In comparison to face-to-face teaching, students are similarly satisfied with the use of a high definition room-based videoconference. Aims: To study the effects of telemedicine assisted teaching methods among post graduate residents in a rural medical college of West Bengal.
Materials and methods: This pilot project was conducted in a Medical Colleges of West Bengal (Burdwan Medical College) with the assistance of Sanjay Gandhi Post Graduate Institute (SGPGI), Lucknow in a time span of one year after taking Institutional ethical clearance and informed consent from the appropriate authorities and the subjects.
All the fifteen Postgraduate students of Physiology department were first exposed to six lecture classes in our department and topics included research methodology and statistical methods. They were provided with a questionnaire after the six classes which consisted of MCQ and short answer type of structured questions and the total marks allotted was 50 and this examination was termed as EXAMINATION II. The questions were provided to them in softcopy and they gave answers online. Before commencement of the study they were assessed in a similar manner to study their basic levels of knowledge and this examination was termed as EXAMINATION I
The same group of student attended 6 telemedicine classes on the same topic conducted by SGPGI Lucknow and similar assessment was done after the classes and this examination was termed as Examination III. In the telemedicine classes they learned how to use SPSS version 16; how to perform statistical tests using excel sheet and Epi Info™ CDC software. This was a hands on training given in the telemedicine class by senior faculty members of SGPGI Lucknow and we had failed to provide this facility to the students during teaching in our department.
Statistical analysis: Data were analyzed using software SPSS version16; probability values (P Value) <0.05 were considered as statistically significant and P Values <0.01 were considered as statistically highly significant.
Results: Learner satisfaction was high in telemedicine assisted learning with an overall score of 4.84 on a 5-point Likert scale. The students performed significantly better in examination II as compared to examination I and II. Marks obtained in EXAMINATION I: 20.3±5.36 vs. EXAMINATION II: 36.65±5.85 vs. EXAMINATION III: 41.1±2.75 and P VALUE <0.01**. All the students were able to correctly perform statistical analysis of their dissertation on their own (without the help of community medicine department) and they were able to publish their research works in indexed journals. Our departmental students of the previous years were lacking this ability.

Conclusions: Telemedicine assisted teaching significantly improved knowledge in fields of research work among postgraduate residents of the department of Physiology and telemedicine needs be a part of medical education in future.

Keywords: Telemedicine assisted learning, research, medical education.

INTRODUCTION

India is the seventh largest country in the world. Seventy-five percent of the qualified doctors in India practice in urban centers, whereas the vast majority of India's population lives in the rural areas. [1]

India plans to establish some 200 new medical colleges in the next 10 years to meet the huge shortage of 600,000 doctors. India is already facing gross shortages of medical teachers. [2-4]

The teacher manpower required for different categories of institutions is based on student intake. The requirement varies from 2 per department to 7 per department for colleges with 50 admissions per year to 2-12 per department for >150 admissions. A total of 70 teachers are required per college for 50 admissions, 90 for >50-100 admissions and 125 for 150 admissions per year. Teachers are required not only for undergraduate but also for postgraduate courses. [5-9] This lack of manpower is posing a great challenge in the field of medical education at present.

Tele-education is an appropriate teaching methodology. In comparison to face-to-face teaching, students are similarly satisfied with the use of a high definition room-based videoconference. The evaluation and selection of appropriate teaching models, teaching tools and methods are important when implementing these types of educational programme. [10] Telemedicine is the use of telecommunications technology for medical diagnosis and patient care. From its beginnings telemedicine has been used in a variety of health care fields, although widespread interest among healthcare providers has only now become apparent with the development of more sophisticated technology. [11-13]

The transfer from a paper-based workflow to an electronic environment in health care has created an increasing need for education in telehealth. Real-time videoconferencing enables education in spite of distance, but it is bound by time and date constrictions that may affect participation. Except it`s content richness, this course is modern in the way of teaching - distance model with interactive information exchange, aiming to ensure the real going into the material essence. Most students rate the developed web courses better than conventional lectures. [10-16]

A prospective, randomized study of medical student education approaches was carried by Kelly LP et al in 2013. First year medical students were randomized to receive vs not receive specific training on interpreting fundus photographs prior to accuracy assessments. Students' preferences for each of the 3 methods (direct ophthalmoscopy on simulators or human volunteers, or use of fundus photographs) and recognition of normal and abnormal fundus features were assessed. Students preferred fundus photographs for both learning and examining the ocular fundus. Identification of ocular fundus features was more accurate on photographs compared to examination by direct ophthalmoscopy. This can be implemented through telemedicine assisted teaching. [11]

A study by Strehle EM et al in 2009 was conducted to assess whether medical students can be taught the pediatric examination of the cardiovascular system (CVS) facilitated by telemedicine equipment. The views of the students regarding this new technology were sought in a subsequent questionnaire survey. The acceptance of this novel teaching method was generally good, but a minority of students (10%) preferred face-to-face

encounters with the lecturer. Teaching by telemedicine is a viable alternative to conventional teaching and should be applied when clinicians cannot meet the students in person. [12]

Beginning with INDIAN SPACE RESEARCH ORGANISATION (ISRO)'s Telemedicine pilot project of 2001, ISRO's Telemedicine Network stretches to around 100 Hospitals all over the country with 78 Remote/Rural/District Hospitals/Health Centers connected to 22 Specialty Hospitals located in the major cities. Telemedicine can enlarge the gap between life and death and can extend quality Healthcare to the needy and the under privileged rural, semi rural and urban population at large. [1]

The provision of continuing medical education (CME) based on the expressed needs of rural and remote medical practitioners tends to be well received and highly valued by workshop respondents. Professional support through the provision of rurally relevant workshop-delivered CME is an effective strategy in retaining doctors in rural and remote communities. These activities can be enhanced with the application of telemedicine. [13,14]

To evaluate the concept of telemedicine orientated educational application by exposing junior medical students to surgical teaching via video-conferencing from the operating theatre and comparing this to the traditional method currently employed, a study was conducted at Telemedicine centre and operating theatre, St Mary's Hospital, London. A questionnaire was used to assess the quality of time spent and information obtained by the students. The median score for surgical teaching utilizing video-conferencing was 9 (scale 0-10) compared to 5 for traditional operating theatre surgical teaching. All subjects indicated a willingness to return for the telemedicine influenced method of tutoring compared to 65% of students exposed to the conventional method. Telemedicine assisted surgical teaching indicated high acceptance and satisfaction rates by clinical students. [16]

All the above studies indicate that implementation of telemedicine along with the conventional teaching methods may have a positive effect on health education and may be of some help in solving the crisis of medical teachers in a developing country like India especially in rural areas. The present study was conducted in a medical college of eastern India situated in rural areas with the help of the Nodal center for telemedicine of the eastern zone to study the effects of telemedicine assisted teaching methods among post graduate residents.

MATERIALS AND METHODS

This pilot project was conducted in a Medical Colleges of West Bengal (Burdwan Medical College) with the assistance of Sanjay Gandhi Post Graduate Institute (SGPGI), Lucknow in a time span of one year after taking Institutional ethical clearance and informed consent from the appropriate authorities and the subjects.

There are eleven Government Medical colleges in West Bengal for undergraduate medical students. Among them six are situated in rural areas and lack different modern facilities. Many Postgraduate departments are not available in these Colleges. There is dearth of doctors having super specialization qualifications (DM, MCH), whereas SGPGI has departments of all super specialization. SGPGI is the telemedicine center for eastern zone. Modern medicine has advanced so much that any deficit in undergraduate and Post Graduate training programmes may result in gross deficit in patient care. Burdwan Medical College is situated in rural areas and provides only conventional teaching methods at present. There is lack of medical teachers and infrastructure in the college. Telemedicine assisted facilities were provided to the PG students of Department of Physiology in Burdwan Medical College with the help of SGPGI, Lucknow. We have an annual intake of 5 PG students and in three years there is a total intake of 15 students in our department. We conduct seminars,

microteaching, practical classes, journal clubs, theory classes for our PG residents. But teaching them important topics of research methodology and statistical methods is not done in our department with adequate competency. So our students are far behind reputed institutions in publishing their research work. They fail to acquire proper knowledge in this domain. They usually perform statistical analysis of their thesis work with the help of community medicine department.

Learning process is both emotional and intellectual. Furthermore, it must have some charismatic influence. This component may affect learning process positively or negatively. Motivation is a key component to any learning and insuring learner's participation. Learning results from practice and experience. In medicine, building up personal knowledge, discussing cases and managing patients are integral components of the learning process. Active learning is known to increase retention and enable the learner to transfer what he has learned to new situations. Learning is a process of bringing about a relatively permanent change in one's attitude. An appropriate learning atmosphere takes care of individual differences, recognizes learner's right to make mistakes, tolerates imperfections, encourages openness, enhances self-esteem, and allows for confrontation of ideas. [17]

Postgraduate medical students have a reasonable access and perception for internet based learning and this should become a part of medical curriculum. Medical teachers should facilitate the use of internet as an important tool of learning. [18]

All the fifteen students of our department were first exposed to six lecture classes in our department and topics included research methodology and statistical methods. They were provided with a questionnaire after the six classes which consisted of MCQ and short answer type of structured questions and the total marks allotted was 50 and this examination was termed as EXAMINATION II. The questions were provided to them in softcopy and they gave answers online. Before commencement of the study they were assessed in a similar manner to study their basic levels of knowledge and this examination was termed as EXAMINATION I

The respondents were also encouraged to furnish their independent and unbiased opinion regarding certain other aspects of T-L principles viz. things most appreciated, things least appreciated, suggestions for improvement and any other remarks in section B of the questionnaire. The participants were also instructed not to provide any personal information, nor to reveal their identity in the questionnaire. Further, the students were discouraged to put in writing any individualized comment about the faculty members or their way of teaching. [19-22]

The same group of student attended 6 telemedicine classes on the same topic conducted by SGPGI Lucknow and similar assessment was done after the classes and this examination was termed as Examination III. In the telemedicine classes they learned how to use SPSS version 16; how to perform statistical tests using excel sheet and Epi Info™ CDC software. This was a hands on training given in the telemedicine classes by senior faculty members of SGPGI Lucknow. All students were advised to bring their laptops along with them in these classes and to install free versions of the software (SPPS and Epi Info™) available online in their laptops. The senior faculty members of SGPGI Lucknow taught them how to use the software and provided them with study materials on relevant topics. We were unable to provide this facility to the students during teaching in our department as most of our faculty members are not conversant with these facilities.

Statistical analysis: Data were analyzed using software SPSS version16; probability values (P Value) <0.05 were considered as statistically significant and P Values <0.01 were considered as statistically highly

significant.

RESULTS

This study was conducted in a timespan of one year among PG students of the department of Physiology. Learner satisfaction was high in telemedicine assisted learning with an overall score of 4.84 on a 5-point Likert scale. The students performed significantly better in examination II as compared to examination I and II (Table1 and Figure1-2). Marks obtained in EXAMINATION I: 20.3±5.36 vs. EXAMINATION II: 36.65±5.85 vs. EXAMINATION III: 41.1±2.75 and P VALUE <0.01**. All the students were able to correctly perform statistical analysis of their dissertation on their own (without the help of community medicine department) and they were able to publish their research works in indexed journals. Our departmental students of the previous years were lacking this ability.

Table 1: Shows comparison of marks of three examinations.

PARAMETER	EXAMINATION I MEAN±SD	EXAMINATION II MEAN±SD	EXAMINATION III MEAN±SD	P VALUE
MARKS OBTAINED (OUT OF 50)	20.3±5.36	36.65±5.85	41.1±2.75	<0.01**

Results showed no significant difference in marks obtained by the two groups.
P-value <0.05* (significant)
P-value <0.01** (highly significant)

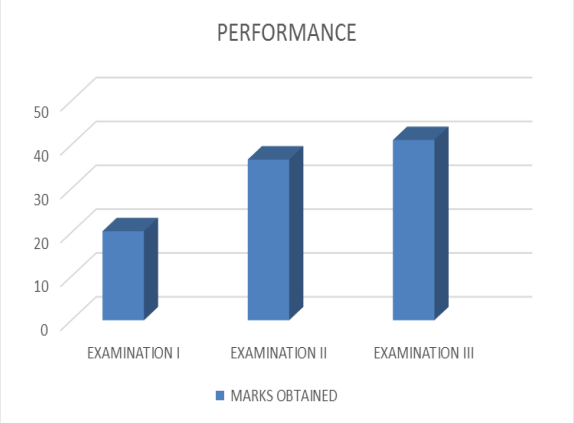

Figure 1: Shows comparison of marks of three examinations.

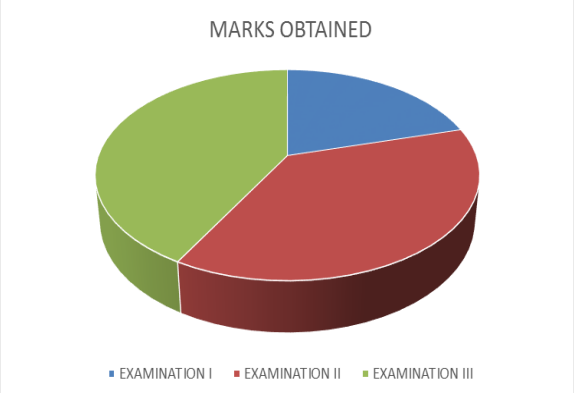

Figure 2: Shows comparison of marks of three examinations.

DISCUSSION

Telehealth applications are increasingly important in various fields of health education and training. They will play a vital role in biomedical research and research training by facilitating remote collaborations and providing access to expensive/remote instrumentation. In order to fulfill their true potential to leverage education, training, and research activities, innovations in telehealth applications should be fostered across a range of technology fronts, including online, on-demand computational models for simulation; simplified interfaces for software and hardware; software frameworks for simulations; portable telepresence systems; artificial intelligence applications to be applied when simulated human patients are not options; and the development of more simulator applications. Telehealth applications have the potential of greatly improving training, education, and research. Key innovations will emerge from research and development in specific areas, and by the integration of technologies already in use for other purposes. These efforts will enhance training, education, and research activities across the nation. [23-24] In the present study we utilized statistical training programmes and research methodology teachings provided by SGPGI Lucknow with the help of telemedicine department to increase knowledge of junior residents of our department. We observed a significant improvement in these areas in these

students.

The increasing cost and inequitable access to quality healthcare, coupled with the merger of the information technology and health service sectors, has given rise to the modern field of telemedicine. Telemedicine allows us to transcend geographic and socioeconomic boundaries to deliver high quality care to remote and/or in-need patients. As technology becomes more affordable and a physician shortage looms, telemedicine is gaining attention as a possible solution to healthcare delivery. Simultaneously, telemedicine holds great promise with regard to medical education. Several studies integrating telemedicine in medical education have shown positive outcomes, demonstrating similar or greater efficacy compared with traditional educational methods with high student-reported enthusiasm. Domestic and international telemedicine projects, largely spearheaded by universities, have also achieved great success. In a novel approach, by pairing medical schools with in-need partner communities, utilizing similar faculty resources as traditional learning methods with standardized patients, students can gain valuable experience and skills while serving actual patients. This progressive approach to medical education fosters collaboration, communication, longitudinal care and teaches students needed skills for their future practices as 21st Century healthcare providers. [23-24]

There were some problems in transmission in a few occasions during the telemedicine classes in our institution during conduction of the study. Despite these obstacles, it seems inevitable that telemedicine will be a part of medical education's future. We feel that the time to broaden telemedicine within education is, now, for the benefit of both patients and providers. Educators should become informed on the opportunities and approaches of telemedicine in education, and play a role in its implementation and regulation. We also organized a workshop in Burdwan medical college along with the help of SGPGI Lucknow and faculty members from all medical colleges from West Bengal participated in this programme. This programme was conducted to increase awareness of telemedicine facilities available in West Bengal at present and the need of implementation of these in present scenario.

CONCLUSIONS

Telemedicine assisted teaching significantly improved knowledge in fields of research work among postgraduate residents of the department of Physiology and telemedicine needs be a part of medical education in future.

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