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Assessment measures to determine role of radiology in undergraduate medical education

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Abstract--Introduction: Radiology is taught less. Knowledge in Radiology and acquiring basic Radiological skills of interpretation are important in development of a medical graduate. This would add to the overall clinical acumen of a basic medical graduate and improve his interest in basic subjects study. Methodology: The Study was conducted on students of SKIMS Medical College in the Department of Anatomy. This was done as a sequential event. Study Population was the First MBBS Students of the same Medical College. Objective: To Check the Response of Medical Undergraduates to Combined Integrative Teaching Methodology. Results: The integration of Radiology with Anatomy was appreciated by a majority (77 %) of students. It was to the liking of most students (73%).It was found to

generate interest in majority of the students (73%). Most students found it interesting to be taught this way (74%). Significant and statistically well-judged results were obtained. Conclusion: Combining Radiology with Anatomy and interpreting radiographic procedures should be started in the studies of First MBBS and a more clinically oriented teaching strategy should be placed. The concept needs to be introduced at an early stage in medical curriculum. This concept has potential benefits for the students.

Keywords---Radiology, Curriculum, skills, integrated, approach, intellectual, innovative, radiographic signs.

Introduction

The Preclinical subjects need to be made more interesting, clinically oriented, student centric and medically applicable. Medical students from their earlier stage of career should be competent enough to make diagnosis and interpret cases. Anatomy as a subject has many branches and subdivisions. Important among them are Regional anatomy like Limbs, thorax, abdomen, head and neck and Neuroanatomy. Radiographic anatomy needs to be emphasized more. The teaching pattern currently is mostly focused on grasping basic and gross anatomy with little emphasis on clinically oriented teaching or case study teaching. Radiology as a subtopic is an important part of Medical Curriculum. It was considered as a Superspeciality. Interpretation of radiological images was not given much emphasis previously.

The time is ripe now that radiology plays a greater role in medical education ¹. The art of Learning Radiology and acquiring skills is an important part of undergraduate education. Dissociative methodology of teaching is not preferred now and most educationists believe that the way ahead is integration of Anatomy and Radiology. Utilizing the Anatomy knowledge to promote skills needed for Radiographic assessment is important. Emphasis is in reduction of anatomy teaching and more clinical and problem based learning. Teaching for Undergraduate Medical Students Presents lots of challenges. Radiology has been used to teach anatomy in undergraduate medicine ². The Article focuses on the Concept of benefits of integration of these two allied branches.

Methodology

SKIMS Medical College offers undergraduate medical education to medical students. The Study was conducted on students of SKIMS Medical College, Government in the Department of Anatomy. This was done as a sequential event. Study Population was the First MBBS Students of the same Medical College. Statistically significant results were observed after giving a Questionnaire. The study involved 81 students.

The students of first MBBS over a period of time were explained the procedure and due consent was taken from the students. Students were taught anatomy and all aspects of Anatomy in classes as per the curriculum along with other

branches. The significance of Radiology as a branch and its effects on students in their future was also underlined in all classes. Interpretation of normal diagnostic procedures like Chest radiographs, radiographs of skull, limbs, Abdomen was done. This was followed by setting a questionnaire. The students were asked to fill in the questionnaire. The results of which are apprehended and tabulated

Discussion

Thorough Learning and Teaching Radiology by innovation and means like virtual radiology, online radiology, and flipped classroom approach, use of interventional radiology or use of artificial intelligence in radiology are being used with each passing day³. It is important for student to have basic knowledge of Chest Radiography, Ultrasound, CT and MRI and he should know about the interpretation of these. Focus on learning and skill development should be the Prime Objective. How to apply, when to apply and where to apply are important. Practical and bedside Teaching is always better than Theoretical teaching. This facilitates the understanding of Anatomical, pathological aspects of disease processes. Radiology education is promoted in most International and renewed intensity. Use of these diagnostic imaging for diagnosis is a basic requirement for a medical graduate to be competent. It is important for Medical graduates to have a good concept of Radiology. It is a Superspeciality subject. It is a part of basic medical curriculum. Medical education is now being standardized. It is an important component of Medical education. Without the concept of Radiology a medical graduate would be incomplete in skills. . With the introduction of Image Based Questions in New NEET Syllabus, Scope of getting more questions in Radiology is more. You can expect image based CXRS, CTs, MRIs from Surgery, ENT, Normal Anatomy .Integration of teaching has been found to improve performance .In some institutions focus is to relearn basic subjects after completion of clinical subjects due to non-integration earlier.

Our Survey on various Examinations like United States Medical licensing examinations, MRCP Examinations, MRCS Examinations as well as Examinations at Post graduate and undergraduate levels show that a large proportion of assessment is done on image based questions. In examinations focus on topics was like Multiple choice⁴ and concept oriented Image Based on CXR and CT Images in Emphysema, Bronchiectasis, Open pneumothorax, Pulmonary embolism, Bony Tumours, Visceral Malignancies, Intestinal Obstruction, Identification of Claw sign Radiologically, Bird Beak sign Radiologically, Colon cut off sign Radiologically and Questions based on Identifying Ovarian Mass, Uterine Leiomyoma, Liver Abscess. As a result our teaching should focus on result oriented teaching. Radiographic skills don't change significantly compared to undergraduates⁵. In Europe Medical Schools offer radiology courses during preclinical and clinical stages of career.⁶

The Art of teaching in integration would mean that on completion of a part of body say Thorax, the medical student should simultaneously be taught how to study a normal chest radiograph. All normal features may be demonstrated to the student and simultaneously he should be given an idea about the usefulness of studying the radiograph. Some Basic Abnormalities may also be shown to him. That would increase his attention and interest. Without giving an idea of clinical

implications of what we teach a student would not take interest in his classes. It is incumbent upon the teacher to increase attention, interest and skill of his students. It may need an extra effort on the part of teacher but the results of his efforts would surely impress him.

This has implications in the student's future especially in branches like Medicine, Surgery, Emergency medicine where the student would be involved in interpretation of radiographic procedures. In addition to integrated teaching focus is also given on encouraging medical students to actively participate in group discussions⁵, take active part in ward rounds, Focus on image based questions, Use Online Resources for Examination Preparation. The competence in radiology is also increasing⁷.

Gross anatomy teaching with inclusion of diagnostic imaging is finding favor.⁸ This is confirmed by the perception of medical students of use of radiology in anatomy teaching⁹. It has found favor in most cases. The Role of Radiology Imaging in Anatomy is appreciated. It is appreciated by Medical students as well as Academicians and Faculty¹⁰. There may be disparities in interpretation but for basic medical teaching we provide simple and non-controversial images¹¹. Deep learning would be done at a later stage in career. The Emphasis is on basic radiology.¹² Given the importance of Radiology the number of teaching hours in Radiology should be increased and teachers should be well educated themselves so that they can deliver effectively and standard ways of teaching be delivered^{16,17}.

It is perceived that radiologists have not fully fulfilled their role in society till now.¹³ Interpretation of radiological procedures like Chest X rays, Simple Ultrasounds and CT Scans seems to influence students positively. Radiology teaching has its own difficulties and some radiology teachers find it difficult to meet the standards and high expectations even with innovative techniques^{14, 15}. It makes them feel more like a professional. From the results we could conclude that students are of the view that integration is important and needed. Most Students like being taught Radiological perspectives along with the normal Radiology. The usefulness of the combined method was appreciated by the most. The interest of the students was seen to increase with teaching both normal and abnormal. The relevance of studying in this manner was found to benefit as reported by students. It was also seen that it would finally improve the skill related to the use of the subject. The only negative thing is that many students found that it would burden them excessively. As far the generation of interest is concerned, it was seen that most students found that such type of combination increases their interest in studies. This seems to be an important factor as anything that increases or improves the interest of a student in studies is bound to produce fruitful results. If students find subjects boring their interest and performance would naturally decrease. Introduction of Image based approach further increases the interest of students. Images seem to motivate students more than text. Imaging facilitates memory. The results were convincing though only simple radiology was highlighted. This was without the use of latest procedures like virtual radiology, online radiology, flipped classroom approach, use of interventional radiology or use of artificial intelligence in radiology.

Results

The Completed questionnaire was returned by students and analyzed by the faculty. Ten questions were a part of the questionnaire. Questions were well explained to the Students of SKIMS medical college of first MBBS year and all queries from students were addressed to so that students completely understand the question. This was done to validate the study. The results were interpreted by the Faculty. It was seen that the integration of Radiology with Anatomy was popular among students. This concept was appreciated by a majority (77 %) of students. It was to the liking of most students (73%) and only a small fraction did not like the concept. The Radiological integration was found to generate interest in majority of the students (73%). This was a good conclusion taking into account that students sometimes report being bored by gross teaching methods. Most students found it interesting to be taught this way (74%). Significant and statistically well-judged results were obtained. On the whole Medical students at early stages of their career are fascinated and positively influenced by introducing Radiology and clinically based teaching methods in their curriculum. These measures ensure more interest and generate more skill development for the beginners.

Conclusion

Medical students receive very less Radiology Teaching. This needs to be addressed. Incorporation of radiology improves student's awareness, concentration and confidence. Using radiological correlates makes students studying more interesting. The Majority of the students expressed their opinion of integrating Radiology with Anatomy and a need for clinical oriented teaching. Everywhere around the World Medical graduates are opting for newer and more innovative teaching methods. Integration of Subjects is appreciated and ensuring better results and more skill development is the core of integration and this applies to radiology as well. Integrated approach of teaching is favored now with incorporation of radiology in a more serious manner. The intellectual curiosity, examination performance, skill development, better understanding is achieved with integrated teaching. The concept needs to be introduced at an early stage in medical curriculum. This is not restricted to developed world only but developing countries are slowly but surely catching up and implanting the Integrated Methodology in their Medical schools.

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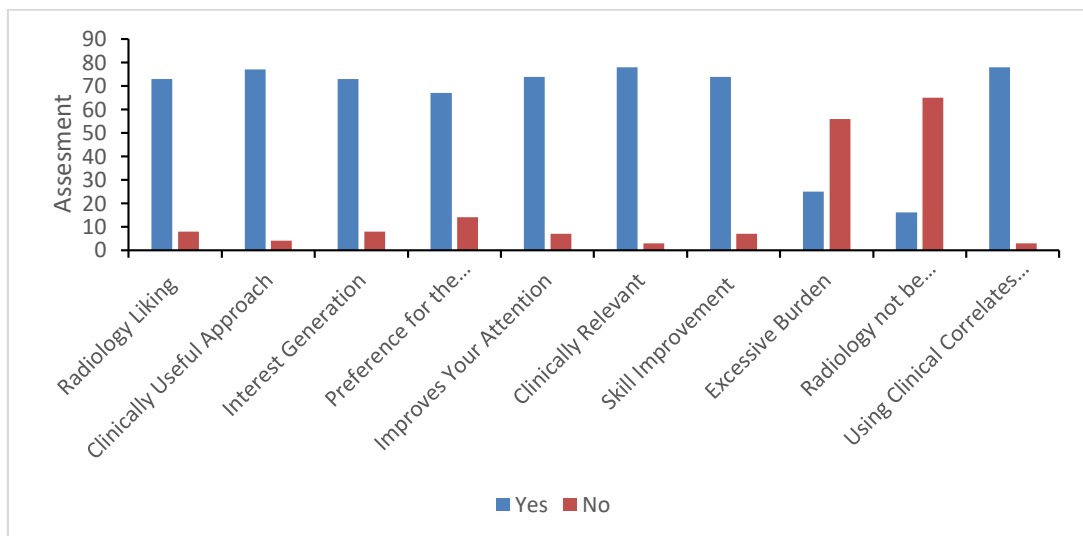
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Figures and Graphs:

Chart 1 (Integrated Teaching questionnaire)

Assessment	Yes	No
Liking	73	8
Useful Approach	77	4
Interest Generation	73	8
Preference for the Approach	67	14
Improves Your Attention	74	7
Clinically Relevant	78	3
Improves Your Skill	74	7
Excessive Burden	25	56
Anatomy and Radiology Should not be mixed	16	65
Using Clinical Correlates and integrated teaching helps	78	3



Graphic: Representation of Students Response to Questionnaire

Statistical Interpretation of Results

t-Test: Paired Two Sample for Means	<i>Yes</i>	<i>No</i>
Mean	63.5	17.5
Variance	528.2778	528.2778
Observations	10	10
Pearson Correlation	-1	
Hypothesized Mean Difference	0	
df	9	
t Stat	3.164439	
P(T<=t) one-tail	0.005734	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.011468	
t Critical two-tail	2.262157	