Perception of multimodal approach in teaching Anatomy among Kashmiri undergraduate medical students for better learning and effective teaching

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Abstract

Introduction: Anatomy is a major subject that is usually considered to be toughest and presents itself as one of the most challenging subjects in medical education. Anatomical knowledge of students is greatly affected by effective teaching methods and engagement of multiple learning modalities has been shown to promote learning. This study aimed to evaluate the Perception of multimodal approach in teaching Anatomy among Kashmiri undergraduate medical students for better learning and effective teaching.

Methodology: This cross-sectional study was conducted among 75 first MBBS students of SKIMS Medical College in the Department of Anatomy. Perception of the multimodal approach in teaching Anatomy was sought by a validated questionnaire. The completed questionnaires were returned by only 72 students and were interpreted after studying the filled questionnaires.

Results: Majority of the students were of the opinion that Anatomy is the most difficult subject among pre-clinical subjects and most of them believed that it was essential to incorporate advancements in teaching Anatomy. 55.55 % were of the opinion that clinically oriented teaching will improve anatomy teaching. Respondent's perceived significantly greater usefulness for Web based applications and incorporating imaging such as MRI, CT and Ultrasound in better understanding the subject.

Conclusion: Teaching Anatomy can become interesting. Incorporation of conceptual learning by advanced virtual three dimensional aids are required along with traditional didactic lectures in providing a successful integrated approach of teaching and learning of basic sciences for better understanding of concepts.

Keywords: Teaching, modality, Atlas, web based, videos, integrated, models, online.

INTRODUCTION

Anatomy is a major subject that is usually considered to be toughest and presents itself as one of the most challenging subjects in medical education in view of its memory retention requirement as well as the focusing needed. [1] The subject is vast and difficult to memorize. It is imperative for the Medical students who are at their early stages of medical career to get properly acquainted with different parts of the subject. Despite that a medical student has to acquire basic, updated and core anatomical knowledge for future subjects and good professional practice. Anatomical knowledge of students is greatly affected by effective teaching methods. Students and teachers both have perceived, anatomy to be boring, static, and dull and a difficult to retain subject. This decreased the interest of the students in the subject. This prompted newer ideas, modification in teaching of anatomy, making interesting changes, adoption of modern approaches, and integrated teaching, learning and assessment strategies. Although, dissection of human cadavers has remained the gold standard for learning anatomical knowledge for hundreds of years, it can provide tactile manipulation of tissue, 3D interaction and engagement of multiple senses, which is not possible by other methods. [2,3] However, it is considered outdated, costly, time-consuming and a potentially hazardous approach.

As such there is a change in teaching from teacher centered to a learner-centered approach by introducing recent advances in technology to foster student learning and problem solving. [4,5] Anatomy education like education in other medical subjects has progressed from with blackboard method to overhead projector then to PowerPoint presentation then 3D models and now more comprehensive tools like virtual dissector, online remote learning using 3D virtual dissection and many technically advanced gadgets including changes in classroom board designs with audio and video assisted devices. The transition from standalone anatomy courses into integrated and system-based curricula, and the reduction of teaching staff, resources and contact teaching hours have led many Western institutions to adopt cost effective, less time consuming and up-to-date teaching alternatives such as plastination, medical imaging and blended learning.

The use of medical imaging in anatomy education provides in vivo visualization of anatomical structure and physiology as well as insight into pathological processes. With the advent of computed tomography (CT), magnetic resonance imaging (MRI) and ultrasound, it has become possible to display highly detailed images of internal anatomy in two-dimensions and 3D reconstructions. [6] Integration of medical images into anatomy curricula offers students the ability to apply basic anatomical knowledge to the interpretation of two-dimensional sectional CT and MRI scans and to correlate clinical relevance with anatomical knowledge. [7, 8]

This study aimed to evaluate perception regarding multimodal approach in teaching Anatomy among Kashmiri undergraduate medical students for better learning and effective teaching.

Methodology

The study was conducted among 75 students of 1st MBBS batch at SKIMS Medical College, Srinagar. The student's perception regarding multimodal approach in teaching Anatomy was sought by a validated questionnaire. The completed questionnaires were returned by only 72 students and were interpreted after studying the filled questionnaires. Thus, the total participants included in the study were only 72. Informed consent was obtained from all the participants. Students were asked to report their findings with open mind and without any phobia or fear and to full in what seemed relevant to them. The results were not influenced by teacher's suggestions, ideas, expressions or emotions.

Eleven questions were included in the questionnaire, which included questions assessing the Perceptions regarding multimodal approach in teaching Anatomy. Care was taken to ensure appropriate distribution of questions from various aspects keeping it relevant to the learning objectives of the course. All results of questionnaire were tabulated and analyzed with the help of Microsoft Excel & Graph Pad in Stat 3 statistical software. ANOVA test was carried out to analyze the comparison of responses. All statistical analysis were set with a significant level of p-value <0.05. Level of signif¬icance and confidence level were set at 5% and 95%, respectively.

RESULTS:

Of the 72 respondents, 32 (44.44%) were female, while 40 (55.55%) were male. The mean (Standard Deviation) age was 20.39 + 0.88 years. The reported Perceptions among students in multimodal approach in teaching Anatomy are presented in Table1.

Majority of the students were of the opinion that Anatomy is the most difficult subject among pre-clinical subjects and most of them believed that it was essential to incorporate advancements in teaching Anatomy. 80.55% of the respondents believed that good teaching not enough to understand Anatomy. 55.55 % were of the opinion that clinically oriented teaching will improve anatomy teaching. 80.55% suggested that Web based applications were effective in understanding Human anatomy better. Majority 83.33% of respondents thought it was essential to incorporate imaging such as MRI, CT and Ultrasound in better understanding of the subject.

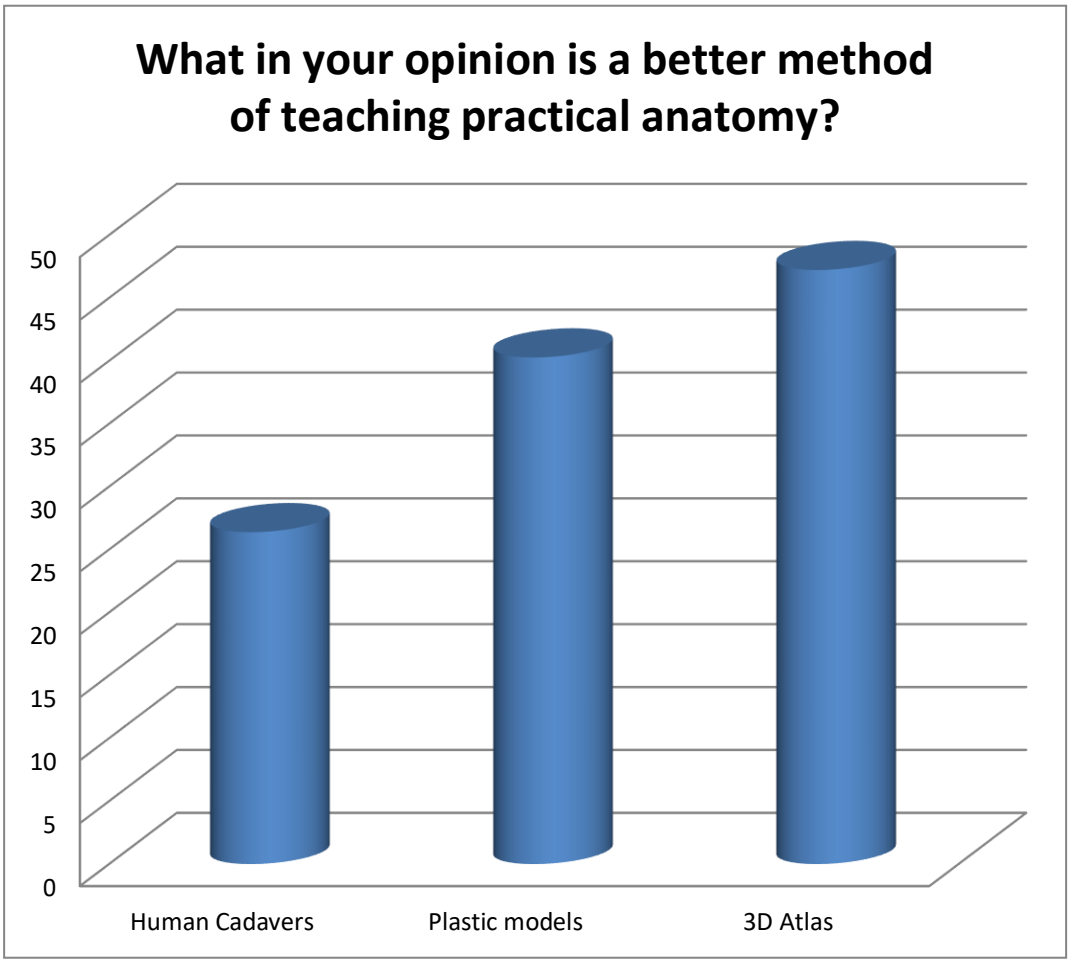
Respondents perceived significantly greater usefulness for Web based applications and incorporating incorporate imaging such as MRI, CT and Ultrasound in better understanding of the subject (P<0.05).

Figure-1 shows students perception towards better method of teaching Anatomy.

Table-1:

S.No	Perceptions among students in multimodal approach in teaching Anatomy	Options	N (72)	%	P value
1	Do you think Anatomy is the most difficult subject among pre-clinical subjects?	Agree	40	55.55	P≤0.01*
		Disagree	27	37.55	
		Unsure	5	6.94	
2	Do you think conventional Anatomy is boring?	Agree	35	48.61	NS
		Disagree	30	41.66	
		Unsure	7	9.72	
3	Is it essential to incorporate advancements in teaching Anatomy?	Yes	58	80.55	P≤0.001*
		No	14	19.44	
4	Do you think good teaching is enough to understand Anatomy subject ?	Agree	24	33.33	P≤0.01*
		Disagree	46	63.88	
		Unsure	2	2.77	
5	Do you think clinically oriented teaching will improve anatomy teaching?	Agree	40	55.55	P≤0.01*
		Disagree	25	34.72	
		Unsure	7	9.72	
6	Do you think Video learning tools are efficient in teaching Anatomy?	Yes	39	54.16	NS
		No	33	45.83	
7	What in your opinion is a better method of teaching practical anatomy?	Human Cadavers	19	26.38	NS
		Plastic models	29	40.27	
		3D Atlas	34	47.22	
9	Do you agree Web based applications are effective in understanding Human anatomy better?	Yes	58	80.55	P≤0.001*
		No	14	19.44	
10	Most common problems faced in understanding the subject?	Boring	19	26.38	NS
		Vastness of Subject	6	8.33	
		Constraint of time	20	27.77	
		Difficulty in retaining	22	30.55	
11	Do you think it essential to incorporate imaging such as MRI, CT and Ultrasound in better understanding of the subject?	Yes	60	83.33	P≤0.001*
		No	12	16.66	
*ANOVA (p<0.05), NS: Non Significant					

Figure-1



Discussion:

Human Anatomy is considered as one of the cornerstones of medical curricula. A deep understanding of anatomy is fundamental for safe clinical practice, particularly in the discipline of medicine and Surgery. [9] In the present study, majority of the students were of the opinion that Anatomy is the most difficult subject among pre-clinical subjects and most of them believed that it was essential to incorporate advancements in teaching Anatomy. The present study revealed that majority of medical students (55.55%) considered Anatomy as a difficult subject. The reason can be attributed to the vastness of the subject. The findings were similar to a study conducted by Gupta S et al. [10] where, Anatomy was identified as the subject with overloaded syllabus (75.4%) and also with maximum clinical application. In a study conducted by Choudhary U et al. [11], contradictory results were observed where half of the participants accepted that anatomy is not dif¬ficult to understand and retain while 51.33% of them felt that one year time allotted to teach anatomy is not sufficient.

Anatomy presents several challenges to first MBBS students. In addition to learning several new terms and concepts in a relatively short time period, they need to apply their learning to solve clinical problems. Typically, Anatomy is taught through didactic lectures and cadaveric dissection. [12, 13] The traditional approach of human dissection after theory lectures is aimed to generate interest, and enable students to apply theoretical knowledge in their future practice. [14, 15] Learning using dissection of human cadavers has advantages as it enhances active and deep learning, prepares students for clinical practice and develops manual skills. [4, 16] Only dissection can provide tactile manipulation of tissue, 3D interaction and engagement of multiple senses. Use of cadavers is also thought to enhance understanding and retention of spatial information and relationships. Virtual Reality (VR) tools do not offer these and may hamper student cognitive function resulting in impaired student learning.

Although AR and 3D printing can offer visual and tactile representations of anatomy, they cannot reproduce all of the sensations that cadaveric dissection can. [2, 3]

In the current study, 80.55% of the respondents believed that good teaching alone is not enough to understand Anatomy. 55.55 % were of the opinion that clinically oriented teaching will improve anatomy teaching. The traditional method involving the use of chalk and blackboard is widely being replaced by presentation software such as PowerPoint which is more convenient. [17] A study conducted by Paracha SA et al. on the assessment of the preclinical students' satisfaction regarding anatomy curriculum revealed that most of them were pleased with the performance of teachers. [18] Undoubtedly, anatomy educators play an important role in providing comprehensive anatomy knowledge for the students. With the rise in the number of medical schools and students and deficient number of anatomy educators and teachers in Anatomy Department were overworked, resulted in a negative effect on anatomy education. [19]

This study aims to perceive multimodal approach in teaching Anatomy among Kashmiri undergraduate medical students and presents both learner and teacher perceptions regarding the experience for better learning and effective teaching. This will benefit others engaged in the teaching of Anatomy at the undergraduate level, allowing for better informed teaching-learning choices. Worldwide, several new teaching-learning approaches have been implemented to enhance student participation and learning Moreover, several studies have provided advanced education methods to help students gain the necessary skills, such as patient educators, multimedia computer-assisted learning, video-based learning (VBL) and simulated patients (SPs). [20, 21] A multisensory approach to teaching clinical skills has been suggested for developing optimal learning. This teaching approach integrates different stimulus mechanisms, such as visual and auditory methods, to increase the recognition and retention of information. [22]

In the present study, 80.55% suggested that Web based applications were found to be effective in understanding Human anatomy better. Majority 83.33% of respondents considered it to be essential to incorporate imaging such as MRI, CT and Ultrasound in better understanding of the subject. Similarly, in a study conducted by Assis FP et al. [15] it was observed that 86% of students found the case based approach to be useful. These findings were consistent with those reported by Nair SP et al, [23] who reported that 84% of students receiving Case Based Learning (CBL) felt the experience would be helpful in future practice and this approach would provide opportunities to integrate the study of Anatomy with other (clinical) disciplines.

Virtual reality and 3D-visualisation technology is advancing and there is excitement for the potential for these technologies. The belief in some institutions is that these technologies are so advanced, that new medical schools can be built with no facilities for cadaveric materials for their programs. [24] Studies by several authors [25, 26] have linked increased usage of dissection videos with related anatomy content to increased examination scores. However, the limitation of such videos on YouTube as a resource without specific links to certain videos is uncontrolled and may potentially show inaccurate content. [27, 28] Studies have shown that learning and retention increase using interactive activities (and simulations. [24, 29]

In our study, the respondents perceived significantly greater usefulness of incorporating incorporate imaging such as MRI, CT and Ultrasound in better understanding of the subject ($P<0.05$). As a result of the explosion in information technology, medical schools have been required to integrate imaging techniques into their medical curricula. [30] The use of medical imaging in anatomy education provides in vivo visualization of anatomical structures. [6] With the advent of computed tomography (CT), magnetic resonance imaging (MRI) and ultrasound, it has become possible to display highly detailed images of internal anatomy in two-dimensions and 3D reconstructions. It can promote better understanding of anatomical spatial relationships and increases their interest in gross anatomy. A study conducted by Cornwall and Stringer, 2014 [31] and other authors [7, 32] suggested that ultrasound demonstrations and viewing imaging of the anatomy, enhances all aspects of learning. Multimodal approach to teaching is the best approach in terms of developing the interest of students and changing their learning styles and providing autonomous supportive environment. [33]

Anatomists are thus, in a perfect position for the paradigm shift to a better teaching and learning environment. To optimize efficient learner time management and maximize future surgical competencies, retention of anatomical knowledge and enhance academic success, problem based learning, case-based learning (CBL), flipped lectures, Virtual histology, Online teaching, Teaching through webinars, Online Assessment methodology, computer-assisted learning, videos, simulations, and virtual interactive 3D teaching should be incorporated in the curriculum.

This study only included a section of students that studied anatomy. This limited scope does not take into account other requirements and learning styles for a large number of students who study anatomy outside the dental curriculum as medical, nursing, Allied Health Sciences nursing or physiotherapy students. Thus the results cannot be extrapolated on to the entire

population. Educators must be aware of choosing the most suitable active learning approaches that meet the objectives of their own courses. Therefore we should focus more on teaching approaches that promote deeper ideas of learning in order to help shape students' views of learning anatomy and help to advance the educational environment.

Conclusion

It is concluded that generation of interest, active participation of and engaging learning strategy is beneficial for teaching subject like anatomy. Undergraduate education should be futuristic to meet needs of post-graduate curricula. All new, modern, integrated and innovative teaching techniques should be used for maximum benefit to promote effective and interactive learning. Overdependence on any one teaching method should be avoided and teaching methods should be flexible in line with existing infrastructure.

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