



CLINICALLY ORIENTED ANATOMY TEACHING (COAT): AN APPROACH FOR DEVELOPING CRITICAL THINKING SKILLS IN UNDERGRADUATE MEDICAL STUDENTS

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ABSTRACT Critical scientific thinking is an essential skill in the process of becoming an expert clinician. COAT(clinically oriented anatomy teaching) was incorporated into anatomy instruction aiming to promote critical thinking skills and to create intrinsic motivation. COAT consisted of two components 1). Critical- thinking questions(CTQ) and 2). Clinical case studies. COAT was introduced after teaching a few topics in Block II. Pre and post test, each containing both the components were conducted. A significant increase in score showed that students performed better in exam 2 ($P<0.0001$). COAT mediated as a spring board for developing critical thinking skills in students

KEYWORDS : Critical thinking, anatomy teaching

Medicine is an applied science, where evidences are interpreted and applied to real life by clinical reasoning skills and experience. Medical education in India is waking up to the reality that there is a need for change from knowledge based education to focus on competency based education in order to ensure quality products, graduates who are competent enough to solve real life problems in the hospital or community. Skill in studying involves the display of understanding of a given material through special skills of performance in examinations. Recall of subject matter is mainly the focus of our examination (1), so the students tend to see the examination as a task requiring them to memorize facts. Apart from attending lectures and reading recommended textbooks, problem solving approach is important in the process of becoming an expert clinician(2). Lectures create an effective learning environment when used with other teaching methods(3). It was reported that medical students had factual information imposed on them and little care had been taken to foster clinical reasoning by integrating various subjects (2). The main focus of the students is to pass the examination or to get a high score. If the students' understanding about basic anatomical concepts is measured by incorporating some reasoning questions in an examination, the outcome is unsatisfactory.

Taking the facts into consideration, Clinically Oriented Anatomy Teaching is designed to achieve two goals: first, to develop critical thinking skills in undergraduate medical students to help them understand and apply the basic anatomical concepts in clinical practice and second to motivate the students to learn anatomy

Materials and Methods

The study was conducted in the Department of Anatomy, Apollo Institute of Medical Sciences and Research, Hyderabad. COAT was incorporated into the curriculum of a class of 100 medical students. The undergraduate Anatomy curriculum is divided into three blocks as follows:

- Block 1: Basic concepts, Upper Limb & Thorax
- Block 2: Abdomen & Pelvis, Lower limbs
- Block3: Head & Neck, Neuroanatomy

COAT was incorporated in Block two to a class of 100 students. COAT consists of two elements: 1) critical – thinking questions 2) clinical case studies.

After a few topics are taught, students will be given assignment based on Critical thinking questions (CTQ) and clinical case studies. Case studies were followed by a series were clarified during classroom discussions. This will be continued till the end of the block. Two examinations each of which contained CTQ and recall questions will be conducted, Exam 1 before the incorporation of COAT, and Exam 2 after the implementation of COAT. Student's scores in both examinations were determined. Also feedback containing nine items on Likert scale was collected from the students.

Results

The mean score obtained by the entire class for both recall questions and CTQ in exam I and II are shown in Fig1. Statistical analysis was

done by comparing the score of recall and CTQ questions in exam I and II with Wilcoxon signed ranks test. When compared with exam 1, the mean score was increased from 2.35 to 5.24 for CTQ and from 1.37 to 2.78 for recall. It was observed that the student's scores were highly significant in exam 2 compared to that of exam 1 ($P<0.0001$) in case of both recall questions and CTQ. Students showed improved performance in exam 2 than 1. Majority of students opined that CTQ enhanced their reasoning skills and promoted in- depth learning of the subject.

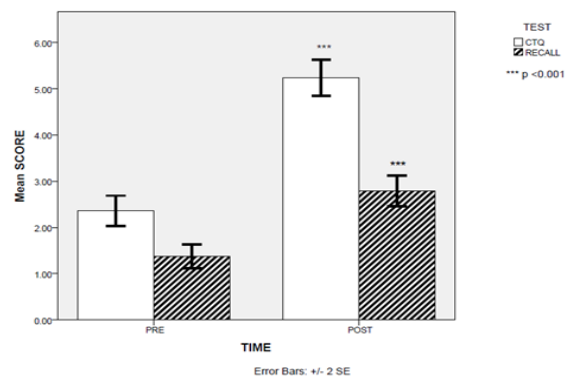


Fig:1 Mean percentage scores for recall questions and Critical thinking questions (CTQ) in exam 1 and 2. $P<0.0001$ for recall between Exam 1 and 2. $P<0.0001$ for CTQ between Exam 1 and 2

Table: 1 Mean percentage scores for recall questions and Critical thinking questions (CTQ) in exam 1 and 2. $P<0.0001$ for recall between Exam 1 and 2. $P<0.0001$ for CTQ between Exam 1 and 2

	Strongly Agree	Agree	Disagree	Strongly Disagree	Uncertain
It motivated me to learn Anatomy	53	44	2	3	2
It helps me gain in-depth knowledge about the subject	53	40	4	1	2
CTQ helps me to reduce misconceptions about the subject	51	40	5	1	3
CTQ stimulates my thinking	40	48	10	0	2
CTQ improves my reasoning skills	50	47	2	0	1
This method helps me to relate anatomical concepts to real life situations	52	41	4	1	2
CTQ and case studies should be included in Anatomy curriculum	46	40	7	3	4

I prefer this type of teaching to didactic lectures	48	41	3	3	5
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Discussion

In order to implement understanding and meaningful learning in undergraduate level of medical education, teaching and evaluation has recommended various methods in the curriculum. In this study, we implemented a teaching methodology towards critical thinking for first year undergraduates. The results reveal that students performed better after introducing COAT.

The significant increased performance seen in both CT and Recall in exam 2 compared to exam 1 could be due to in- depth learning of the subject matter by the students. Orienting the students to such a methodology at the commencement of the block would have changed the student's way of learning from memorization to meaningful learning and COAT promotes active learning in students.

Students must use critical-thinking skills to relate basic concepts to real-life situations (4,5). Most of our examinations demand mere recall of the subject matter (1), so the students tend to see the examination as a task requiring them to memorize facts. On the other hand, if the examination demands student understanding of the subject matter, they place more emphasis on it. Teaching knowledge as sets of facts to be stored and retrieved to answer anticipated test questions is hardly a form of learning and certainly not effective for long term retention (3). According to Smith et al, problem solving in medicine refers to the ability to use clinical reasoning skills (2). Various authors have reported different ways of implementing clinical reasoning in the curriculum (7,8). Since critical reasoning is a skill, it is teachable and was taught at Mc Master University (9). Studies have reported that students who spend more time in independent learning tend to adopt a deep approach. The assignments administered through COAT, helped the students to correlate the basic anatomical concepts with the most common clinical conditions in real life.

The facilitator takes a key role in promoting critical thinking skills in students. Clinical conditions with real- life scenario and personal relevance to students promote critical thinking in students (5). Authentic open- ended and thought- provoking questions demand critical thinking in students. COAT includes clinical case studies that has real – world contexts and hence promote problem solving in an effective manner.

COAT has improved intrinsic motivation in students. This concept seen in our results was supported by Reem et al and Seale et al who reported that assessment had the potential to motivate students and thus influence their performance. This was very well seen in the significant improvement in their performance in exam 2.

COAT was well accepted by the students. The students showed an increased interest in clinical reasoning skill which promoted in- depth learning. COAT acted as a spring board for critical thinking. In fact this method of learning had a huge impact on the thought process and decision making skills of the student and promoted the need for life long learning.

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