

## **“Learning Outcome Analysis of Preclinical MBBS Students Following Teaching by Anatomist and/or Clinician.”**

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### **Abstract:**

**Introduction:** In conventional curriculum anatomy is taught by an anatomist and the stress is teaching “clinically meaningful anatomy”. In certain parts of the world the teaching of anatomy is taken over by the clinicians. Evidence based studies, suggesting that clinicians can take over the role of basic science teachers are lacking. The present study was carried out to evaluate the performance of students when taught by anatomist or clinician.

**Methods:** The study was conducted on 180 MBBS first year students. All the students were randomly divided into three groups. First group was taught by a faculty from anatomy, second group by faculty from Obstetrics and Gynaecology and third group by Anatomist after discussing with one of the faculty from Obstetrics and Gynaecology. Four lectures were taken on various topics of female reproductive anatomy with the help of multimedia and a pre and post test of same set of 10 MCQs of related topic was conducted. Difference in the post and pretest marks (in percentage) were compared statistically as a measure of effectiveness of resource person.

**Results:** Group I attained a difference of  $11.03\pm 15.5\%$ , group II  $13.08\pm 14.4\%$  and group III  $17.12\pm 16.2\%$  in gross anatomy part while a difference of  $8.30\pm 14.2\%$ ,  $21.78\pm 14.9\%$  and  $20.74\pm 16.6\%$  was obtained in clinical anatomy section respectively.

**Conclusion:** The outcome analysis revealed that gross anatomy teaching was at par in each group but in clinical anatomy section groups taught by either clinician or after consulting clinician exhibited statistically better performance.

**Key Words:** Medical education, anatomist, teaching, undergraduate

**Key notes:** Effect of teacher variable on the performance of students in Anatomy

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### **Introduction:**

Teaching of basic sciences, particularly anatomy in medical schools is in a state of change. The time allocated to anatomy in medical schools is unlikely to increase and therefore focus must move to the curriculum and methods used for its teaching and learning. It is at present a highly controversial topic that how much and what kind of anatomy should be taught to medical undergraduates. It is a worldwide common opinion that anatomy must be taught and learnt in such a way that it becomes clinically meaningful and is related to the competences required by new medical graduates so that the students understand its relevance to their future practice.

To answer, how, clinically meaningful anatomy should be taught, problem based learning was introduced which was supposed to enhance the integration of basic and clinical sciences. Countries like North America, UK, Canada and Australia have already adopted Problem Based Curriculum. Studies conducted by Hinduja et al and Nayak et al reported that students taught by problem based learning approach have less core anatomy knowledge.<sup>1,2</sup> Drawbacks of reduction of course content of anatomy in PBL based curriculum are evident in the form of important intra-operative errors, commonest reason for settlements of claims related to general and vascular surgery in UK.<sup>3</sup> Despite of this, some clinicians still believe that anatomy seeks a severe reduction in the content of the factual information.<sup>4</sup>

An important question that who should teach anatomy is also under experimentation. In an attempt to teach anatomy in more clinically meaningful way, in countries like France the subject is completely handled by clinicians, surpassing the role of anatomist. Evidence regarding better performance in preclinical subjects by students when taught by clinicians is lacking. The medical educationists till date have not reached to a common consensus that how and by whom a clinically meaningful anatomy should be taught.

True experimental studies comparing the core knowledge acquired by learners when taught by different expert resource persons from different specialties on the same subject are lacking. Additionally, most of the experimental studies in the field of medical education draw their conclusions by evaluating responses on questionnaires. Therefore present study was planned an experimental study hypothesizing that a clinician can teach better clinical anatomy as he has practical exposure to real situations as compared to an anatomist, who has only theoretical or textbook based knowledge. The aim of the present study was to evaluate any difference in the level of knowledge of gross and clinical anatomy among first year MBBS students when taught by Anatomist alone; Clinician alone and Anatomist after consulting Clinician.

#### **Methods:**

This randomized control trial study was conducted on 180 MBBS first year students. After approval from institutional ethical committee, informed consent was taken from each student participating in the study. All the students were randomly divided into three groups. Each student was given an identity number. Information regarding various factors which could affect the performance of group like age, sex, stratum (rural/ urban), socio-economic status, schooling (government/public/convent), board, medium of instruction, percentage of 10+2, years lapsed after 10+2, qualification at the time of joining MBBS course, overall rank in the selected course, hours of self study per day, earlier exposure to multimedia, hosteller/ day-scholar etc. were collected (Table 1).

In first group, gross anatomy and related clinical anatomy of selected topics was taught by a faculty from anatomy department, in second group by the faculty from Obstetrics and Gynaecology

department and in third group by the Anatomist, after discussing the topic with one of the faculty from Obstetrics and Gynaecology department. In third group the content of each lecture was moderated by clinician. Total four lectures of 1 hour each were taken on various topics of female reproductive anatomy. The lectures on same topic were conducted simultaneously, once a week, for all the three groups. Teachers allocated to each group remained same for all lectures. All the lectures were taken with the help of multimedia in the form of power point presentations. Teachers of all the three groups were requested not to discuss the content of their lectures with each other.

To evaluate the acquisition of knowledge by the students of each group a pre and post test of same set of 10 MCQs of related topic was conducted immediately before and after each class. These questions along with their keys were framed by two senior faculty members one each from Anatomy and clinical department who were not involved in taking lectures. All test papers were marked under blind conditions. A questionnaire consisting of 10 questions on Likert scale of 1-4, was distributed at the end of each class to evaluate the performance of teacher of each group. The percent scores obtained by each faculty were compared using Kruskal Wallis test (Table 2).

Data was analysed using statistical software: Stata Version 11.1 (Stata Inc. Texas US). Oneway ANOVA/ Kruskal Wallis test was used for comparing continuous data among groups for normally distributed data, otherwise normal distribution was tested using Shapiro-Wilk's test. Equality of variance across groups was tested by Bartlett's test. Bonferroni test was used for post-hoc multiple comparisons between groups. Categorical data was compared by chi square test. A traditional p-value 0.05 or less was considered significant.

### **Results:**

Statistical analysis of various confounding factors like age, sex, stratum (rural/ urban), socio-economic status etc. revealed that they were equally distributed among the groups (Table 1). The analysis of faculty evaluation form showed that there wasn't any significant difference in the performance of three teachers who were engaged in teaching the groups, as adjudged by the students (Table 2). The questions of every test paper were categorized into two parts- (i) gross anatomy (ii) clinical anatomy. Marks obtained by each student in all the classes were converted in to percentage for both pre and post test. Knowledge acquired by the students of respective groups was measured in terms of difference in the pre and post test percent scores. Difference between pre and post test marks of gross anatomy was highest ( $17.12 \pm 16.2\%$ ) in group III but it was not significant statistically. As far as the percent scores of clinical anatomy part was concerned, highest difference ( $21.78 \pm 14.9\%$ ) was observed in the group taught by clinician i.e. group II while the group taught by anatomist (group I) showed least difference ( $9.57 \pm 9.2\%$ ) and the difference was statistically significant too. When the total of gross and clinical parts was analyzed, the performance of group III i.e. group taught by anatomist after consulting clinician was found to be best and was statistically significant (Table 3).

**Table 1: Comparison of student variables among 3 groups**

Student Variable		Group I (n=60)	Group II (n=58)	Group III (n=62)	p-value
*Age(years)		20.98±2.5	21.43±2.4	20.92±2.1	0.494
*% in 12 <sup>th</sup> std.		73.28±11.5	72.72±11.0	72.01±11.7	0.7364
*Year lapsed after 12 <sup>th</sup> std.		3.22±2.1	3.71±2.6	3.44±2	0.584
*Self study		3.55±1.2	3.74±1.8	3.35±1.1	0.705
Sex	<i>Female</i>	26.67	17	15	0.818
	<i>Male</i>	73.33	41	47	
Residence	<i>Rural</i>	28	25	28	0.927
	<i>Urban</i>	32	33	34	
Boarding	<i>Day-scholar</i>	9	3	5	0.170
	<i>Hosteller</i>	51	55	57	
Exam Board	<i>CBSE</i>	21	21	21	0.589
	<i>ISC</i>	8	5	6	
	<i>UP</i>	31	28	32	
	<i>Others</i>	0	4	3	
Graduation	<i>No</i>	54	52	52	0.509
	<i>Yes</i>	6	6	10	
Medium	<i>English</i>	32	32	28	0.502
	<i>Hindi</i>	28	26	34	
**Schooling	<i>Govt.</i>	32	32	39	0.749
	<i>Public</i>	21	17	16	
	<i>Convent</i>	7	9	7	
**Category	<i>General</i>	19	22	23	0.988
	<i>OBC</i>	28	25	26	
	<i>SC</i>	11	10	11	
	<i>ST</i>	2	1	2	

\*Kruskal Wallis Test, Chi square Test & \*\*Pearson Chi square Test

**Table 2: Analysis of the faculty evaluation by students of different groups**

Group	N	Mean±SD (%)	Kruskal-Wallis test
I	58	87.62±5.4	0.1055
II	59	85.82±5.0	
III	58	86.27±6.8	

**Table 3: Comparison of percent means of test scores among 3 groups**

	Group I (n=60)	Group II (n=58)	Group III (n=62)	p-value
	% Mean±SD	% Mean±SD	% Mean±SD	
<b>Gross</b> <i>Pre-test</i>	49.13±15.9	46.37±16.6	41.78±17.2	0.099
<i>Post-test</i>	60.16±13.8	59.45±17.4	58.90±15.5	
<i>Difference</i>	11.03±15.5	13.08±14.4	17.12±16.2	
<b>Clinical</b> <i>Pre-test</i>	43.35±14.8	31.14±13.2	35.82±16.9	<0.0001
<i>Post-test</i>	51.65±13.9	52.9±15.2	56.56±17.9	
<i>Difference</i>	8.30±14.2	21.78±14.9	20.74±16.6	
<b>Total</b> <i>Pre-test</i>	46.74±12.5	39.12±13.3	39.73±16.1	<0.0001
<i>Post-test</i>	56.31±12.3	56.37±14.7	58.06±13.2	
<i>Difference</i>	9.57±9.2	17.25±12.1	18.33±12.3	

**Discussion:**

Outcome analysis revealed that the acquisition of knowledge of the students taught by clinician alone or anatomist who consulted clinician was better than those who were taught by Anatomist. But when the questions were categorized in gross and clinical parts, performance of group II and III was found better in clinical section as compared to group I, whereas performance in gross anatomy parts was at par among groups.

According to Singleton, clinicians in the past were the teachers of fundamental subjects and therefore the subjects were always presented to medical students with their clinical applications. But as busy clinicians could give little efforts to research, gradually research teachers replaced the clinical

teachers. He supported the views of Cheever, who was of opinion that if the systematic instruction is given by a professor who has no clinical experience, who knows only from hearsay-if at all-and is not concerned with the reasons why anatomical facts are of importance to the practicing physician or surgeon; whose real interest and enthusiasm lie in the field of comparative morphology or experimental embryology, it can scarcely be expected that the subject shall be presented in a stimulating, interesting and profitable manner.<sup>5</sup> This presumption was proved true in a study conducted by Stevenson et al in which students rated clinicians higher in several content expertise- linked area, preparedness, promotion of in-depth understanding and ability to focus the group and down-rated basic scientist for demonstrating overspecialized knowledge.<sup>6</sup> Very recently in a Medical school of Malaysia a workshop was organized for clinicians to teach anatomy to first year medical students. The author claimed that trained academics in anatomy are lacking and clinicians can teach anatomy which they know and use, with an in-depth understanding of anatomical facts, relevant to patient care. It is believed that they may emphasize clinically useful facts in more interesting way by giving examples of real clinical issues that arouse interest in students.<sup>7</sup>

Relatively poor performance of clinical section of group I could be attributed to under exposure of anatomist to clinical situations. An Anatomist is exposed to various clinical subjects during his/her graduation (MBBS) only. 3 year postgraduate course in anatomy revolve around acquisition of dissection skills and minutia of anatomical facts without any clinical exposure. The situation is exaggerated with those anatomists who are non medical. Due to scarcity of medical post graduates, non medical post graduates in anatomy are also catering undergraduates in many medical colleges in India as well as abroad. The clinical knowledge that an anatomist imparts is based on the information available in the books of clinical anatomy, which is a theoretical knowledge and not practically acquired.

Incorporation of Integrated curricula in medical schools of India is yet in a state of introduction, after its recommendation in 1997 by MCI. Despite of its recommendation , due to lack of proper guidelines for implementing the curriculum , institutions are working hard to remodel their existing methods.<sup>8</sup> Ideally, an integrated curriculum refers to a non compartmentalized approach to basic sciences during first 2 years with a major component of Problem Based Learning. We, a hundred year old institution, are still following a non-integrated (conventional/ traditional) curriculum in which anatomy is taught by an anatomist. We have adopted a hybrid approach for teaching clinical anatomy, in which the core anatomy knowledge is delivered in the form of lectures or demonstrations and applied part is taught in the form of PBL (virtual problems collected from books) in separate classes. Institutional curriculum committee should take initiative to arrange interactive sessions of preclinical and related clinical faculty members so that need based curriculum could be developed which will be more useful for the students in subsequent years.

**Conclusion:**

As in PBL modules, core anatomy knowledge suffers adversely therefore a modified integrated approach for teaching clinically relevant anatomy is required. The present study clearly states that desired objectives may be accomplished by joint efforts of clinician and anatomist.

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