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# **Original Research Article**

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# Study of impact of vertical integration in medical education in a medical college of India

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#### **ABSTRACT**

**Background:** It is postulated that memory of basic sciences in medical curriculum and its correlation with clinical work among undergraduate students is less than expected, which drives into the dire necessity to vertically integrate the subjects. The aims and objectives of the study were to assess the impact of vertical integration of teaching among medical undergraduate students of a medical college and to assess the perceptions of the medical undergraduate students about the vertical integration of teaching during lecture classes in a medical college.

**Methods:** Ninety six out of 119 second MBBS students had undergone vertically integrated sessions by six departments of a medical institute on assessment and management of diarrhoea using four interactive methods and two traditional teaching methods during April 2015 to September 2015 among the M.B.B.S. students of Rohilkhand Medical College and Hospital, Bareilly. Inclusion criteria were all the M.B.B.S. 2nd year students of 2013 batch were included in the study. Exclusion criteria were the M.B.B.S. students who were absent on the day of study were excluded. Competency of students was assessed using competency based assessment methods i.e. OSCE, OSPE, DOPS, SAQ and MCQs and their perceptions recorded using Likert's Scale. Comparative analysis of pre and post-tests was done using paired t-test and ANOVA.

**Results:** The difference between the mean value of the marks obtained by the medical students using the five assessment tools was found to be statistically significant (p value being <0.05) using paired t-test, showing improvement in competency. Vertical integration was strongly agreed upon as the best method by 45.8% on Likert scale. Comparative analysis of variance (ANOVA) of the assessment tools was also found to be highly significant (p value being <0.05).

**Conclusions:** The indexed study derives us to a conclusion to incorporate vertical integration in our medical education in order to accomplish higher learning domains.

Keywords: Integrated teaching, Medical education, Assessment tools

## INTRODUCTION

The memory of medical undergraduates/students about the basic sciences i.e. topics of anatomy physiology and biochemistry in the medical courses is less than expected, and the content of the courses also seems irrelevant to their later clinical work or studies as they build their clinical knowledge on the grounds of previously obtained basic knowledge. <sup>1,2</sup> The basic science knowledge retained by students seems to be the central question for medical education and its application in the clinical sciences. <sup>2,3</sup> The rationale of the indexed study was that teaching becomes questionable if students are unable to use the

knowledge they'd been taught, if that knowledge becomes inert and inaccessible, defining the need for integrated teaching as currently the vertically integrated classes rarely organized in the medical colleges of the Indian subcontinent.<sup>4-6</sup>

# **Objectives**

- 1. To assess the impact of vertical integration of teaching among medical undergraduate students of a medical college
- To assess the perceptions of the medical undergraduate students about the vertical integration of teaching during lecture classes in a medical college.

#### **METHODS**

First approval for the research was taken from the IEC. The questionnaire was validated using pilot testing among the students attending the clinical posting in a small group before conducting the cross sectional study design.

The sample size was 119 second MBBS students of a medical institute. Pre-test was carried out among 96 second MBBS students before vertically integrated lectures on various topics of diarrhoea including preparation and use of home-made ORS (Table 1). The duration of vertically integrated session was 2 hours 5 minutes using four interactive methods and two traditional teaching methods (Table 1).

Table 1: Contributions and teaching activities by faculty members from various departments.

Names of the departments	Contributions	Duration in minutes
Physiology	Lecture on "Physiological aspects of diarrhoea"	10
Biochemistry	Lecture on "Basics of ORS and composition of ORS"	10
Microbiology	Lecture on "Microbiological basis of diarrhoea"	10
Pathology	Lecture on "Pathological basis of diarrhoea"	10
Paediatrics	Lecture on "How to take clinical history and how to examine a case of diarrhoea with dehydration"	10
Community medicine	Lecture on "How to prepare and how to use home-made ORS"	
Community medicine	Think-pair and share	5
Community medicine	Continuing lecture	5
Community medicine	Case based learning	5
Community medicine	Conducted a role play on "How to prepare and how to Use home-made ORS"	20
Community medicine	Tutorial	10
Community medicine	Case demonstration in the field	20
Total duration		125 minutes (2 hrs 5 min)

First six faculty members had taken vertically integrated session on topic "Diarrhoea including preparation and use of ORS."

The impact of vertically integrated lectures was assessed by pre-session and post-session assessments. Assessment of the students was done using MCQs, SAQ, OSCE, OSPE and DOPS. The Likert scale was also used to assess the students' perceptions about vertically integrated teaching methods during pre-session and post-session assessments.

The comparative analysis was done after post-test. Statistical Package for the Social Sciences (SPSS) was used for the analysis of the data obtained during the study. Students paired "t" and ANOVA were used for statistical analysis and "p" value <0.05 was taken as statistically significant.

#### **RESULTS**

Vertical integration will be more helpful in real professional life scenario than in passing the exams was agreed upon by 42.7% on the Likert's scale (Table 2).

The difference in the scores of the Likert scale used in pre and post sessions to know the perception of the students regarding vertical-integrated teaching is found to be statistically significant.

Mean value of the marks obtained using the assessment tools was higher in post-test as compared to the pre-test and the difference was found to be statistically significant, showing improved competency among the students (Table 3).

In the present study it was observed that the overall performance of the students was improved. And the more important observation in this study was that the improvement was independents to the assessments tools as the comparative analysis of variance of the assessment tools like OSCE, OSPE, DOPS, SAQ and MCQs comes out to be highly significant (Table 4).

Table 2: The descriptive statistics of vertical integration in medical education on Likert's scale.

	Strongly disagree=1	Disagree=2	Neutral=3	Agree=4	Strongly agree=5	Total
Vertical Integration of teaching as best method of teaching	1 (1.0%)	0	13 (13.5%)	38 (39.6%)	44 (45.8%)	96 (100.0%)
Vertical integration is better than horizontal integration	1 (1.0%)	2 (2.1%)	24 (24.7%)	44 (45.8%)	25 (26.0%)	96 (100.0%)
Vertical integration will be more helpful in real professional life scenario than in passing the exams	2 (2.1%)	2 (2.1%)	15 (15.6%)	41(42.7%)	36 (37.5%)	96 (100.0%)

Table 3: Descriptive and analytical statistics of the various assessment tools.

	$N_{ m pre}$	Mean <sub>pre</sub>	Standard deviation <sub>pre</sub>	Standard error mean <sub>pre</sub>	$N_{ m post}$	Mean <sub>post</sub>	Standard deviation <sub>post</sub>	Standard error mean <sub>post</sub>	t-value	Pvalue
DOPS	96	9.07	3.116	0.318	96	13.94	2.934	0.299	-11.646	0.000
OSCE	96	2.22	1.467	0.150	96	3.55	1.457	0.149	-6.356	0.000
OSPE	96	2.13	1.401	0.143	96	3.95	1.356	0.138	-9.359	0.000
SAQ	96	0.94	0.723	0.074	96	2.30	0.809	0.083	-13.569	0.000
MCQ	96	1.43	1.122	0.114	96	2.21	0.792	0.099	-5.682	0.000

Table 4: Comparative analysis of variance (ANOVA) of the assessment tools.

		Sum of squares	df	Mean square	F	Significance
DOPS	Between groups	174.132	2	87.066	10.820	0.000
	Within groups	748.358	93	8.047		
	Total	922.490	95			
OSCE	Between groups	47.237	2	23.619	13.976	0.000
	Within groups	157.169	93	1.690		
	Total	204.406	95			
OSPE	Between groups	45.978	2	22.989	15.214	0.000
	Within groups	140.522	93	1.511		
	Total	186.500	95			
	Between groups	2.014	2	1.007	1.967	0.146
SAQ	Within groups	47.611	93	.512		
-	Total	49.625	95			
MCQ	Between groups	3.801	2	1.900	1.528	0.222
	Within groups	115.689	93	1.244		
	Total	119.490	95			

### **DISCUSSION**

The present study was conducted to assess the impact of vertical integration on one particular topic i.e. Diarrhoea Including Preparation and Use of ORS. In vertically integrated programmes basic and clinical topics are studied in parallel and in integration with each other (Lie 1995).<sup>7</sup>

The assessment has the powerful positive accelerating effects on learning and the curriculum and measuring progress in acquiring core knowledge and competencies may be difficult for the departments of a medical institute therefore many competency based assessment tools were developed and used by medical researchers for the purpose.<sup>8</sup>

In the present study it was observed that the overall performance of the students was improved. And the more important observation in this study was that the improvement was independents to the assessments tools as the comparative analysis of variance of the assessment tools like OSCE, OSPE, DOPS, SAQ and MCQs comes out to be highly significant (Table 4). Assessment tools of the competency based medical education (CBME) also indicated that the improvements of the students were in

all the domains. Their knowledge on the subject, their behaviour and attitudes to the patients, attendants and fellow colleagues, their communication, clinical and professional skills were improved.

In the present study the MCQs came out as best assessment tool so it is a good sign of improvement in various competencies and various other studies also concluded that multiple-choice questions (MCQs) test the attitudes, skills, knowledge, and competency in medical school.<sup>9</sup>

One more study on the vertical integration stated the same observations but differently. According to the study a vertically integrated curriculum at medical school positively affects the transition to postgraduate training. It was also observed that graduates from a vertically integrated curriculum had made the definite career choice at an earlier stage and need less time and fewer applications to obtain a residency position in comparison with those who followed a traditional programme. Therefore subsequently in recent years, many medical curricula have become more vertically integrated.<sup>9</sup>

Another important characteristic of most of the vertically integrated curricula is early clinical experience. <sup>10-13</sup>

#### **CONCLUSION**

It can be very well concluded that vertical integration in teaching the one particular topic shown improved competency among the students and it can also be concluded that vertical integration is strongly agreed upon as the best teaching aid on the Likert's scale. This calls upon the need to incorporate vertical integration in our medical education. And the use of OSCE, OSPE, DOPS, SAQ and MCQs as assessment tools should also be promoted in the medical institutes. So vertical integration in the teaching and use of assessment tools of competency based medical education (CBME) can be helpful in improving competence among medical graduates if wisely incorporated in during teaching and assessment in the medical institutes.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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