INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFECT OF INTEGRATED TEACHING ON COGNITIVE DOMAIN SCORES OF MEDICAL STUDENTS

Community Medicine

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ABSTRACT

This comparative, before-and-after study (without controls) was conducted to determine the differences in cognitive domain scores of first-year medical students after traditional didactic lectures and that after integrated teaching. The pre-test was conducted after traditional didactic lectures, while an identical post-test was conducted after integrated teaching. The outcome studied was the difference in cognitive domain scores after traditional didactic lectures and integrated teaching. The overall mean scores (out of 20) increased significantly (Z=6.663; $p<0.0001$) from 12.27 ± 3.64 in the pre-test to 16.10 ± 2.69 in the post-test. In both the pre- and post-tests, female students obtained higher mean scores in nine out of ten questions. Integrated teaching was found to significantly increase cognitive domain scores.

KEYWORDS

Cognitive domain, Integrated teaching

INTRODUCTION

Integrated teaching (IT) involves inter-relating different aspects of the same topic, which is routinely taught by different academic departments as parts of separate subjects.[1] Horizontal integration refers to the amalgamation of teaching in two or more subjects that are taught in the same phase of the curriculum, while vertical integration is that between subjects taught in the different phases of the curriculum.[2] Since the dissemination of information from diverse subjects is synchronized, IT saves time and efforts of teachers.[3] Implementation of IT forestalls the patchy and acquisition of disjointed and segregated bits of information in isolation and converts knowledge into handy tools for learning new know-how.[4] Integration provides learners with a holistic outlook and enables them to comprehend new perspectives.[5]

Harden's integration ladder [6] envisages curricular integration as an eleven-step ladder, with subject-based isolated teaching comprising the first four steps of the ladder while increasing levels of cross-disciplinary integration is represented in the upper six steps. In the final eleventh step of the ladder, the student takes more responsibility for the integration and is empowered with the requisite tools.[6] IT has been extensively implemented after realizing that the traditional modes of teaching pre-clinical subjects as water-tight compartments without cross-links and clinical applications often let down the students when they proceed to clinical clerkships.[7,8] An integrated approach to education enables applied learning and constructive clinical reasoning.[9,10] The Medical Council of India[11] has advocated IT in different phases of the MBBS course. The topics for IT are by and large chosen on the basis of interdisciplinary nature, preventability, and conditions that describe basic science concepts.[12] The objective of this study was to compare the cognitive domain scores obtained by first-year MBBS students after traditional didactic lectures with that obtained after integrated teaching.

MATERIAL AND METHOD

This comparative, before-and-after study (without controls) was conducted between November 2017 and December 2017 at Rajiv Gandhi Medical College, with an annual intake capacity of 60 students, located about 30 kms from Mumbai city in Western India.

The participants included all first-year MBBS students, aged 18 years and above, of either sex, who gave written informed consent. Those students who did not give written informed consent or those who were absent during the traditional didactic lectures or integrated teaching or pre-test or post-test were excluded.

After obtaining prior permissions from the Institutional Ethics Committee and institutional authorities, the purpose of the study was clarified to first-year MBBS students and written informed consent was obtained from those willing to participate in the study. As per syllabus for the first-year MBBS course, traditional didactic lectures (TDLs) were delivered on the endocrine system and a pre-test was conducted after TDLs. The pre-test comprised ten questions (two marks per question; total 20 marks). After the pre-test, IT on the endocrine system was conducted by teachers from departments of Physiology and Community Medicine. Using a questionnaire that was identical to that of the pre-test, the post-test was conducted after IT. The outcome studied was the difference in cognitive domain scores after TDLs (by a pre-test) and IT (by a post-test).

The data were presented as mean and standard deviation (SD). Confidence interval (CI) was calculated using the formula: [Mean-(1.96)*Standard Error)] - [Mean+(1.96)*Standard Error)]. EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA) was used for statistical analyses. Statistical significance was determined at $p<0.05$.

RESULTS

29 females (52.54%) and 33 males (47.46%) – a total of 62 students – participated.

Cognitive domain scores: The overall mean scores (out of 20) increased from 12.27 ± 3.64 (95% CI: 11.37 - 15.43) in the pre-test to 16.10 ± 2.69 (95% CI: 13.18 - 16.77) in the post-test, exhibiting high statistically significant (Z=6.663; $p<0.0001$) difference.

Gender differences in scores: In the pre-test, the minimum, first quartile, and third quartile scores (out of 20) were identical for participants of either gender. However, the median and maximum pre-test scores were higher for male students. (Figure 1) In the post-test, female students obtained higher minimum, first quartile, and median scores as compared to their male counterparts. The third quartile and maximum post-test scores were identical for both males and females. (Figure 1) In both the pre- and post-tests, as compared to their male counterparts, female students obtained significantly higher mean scores in question Nos. 1 to 9 while there was no gender difference in mean scores for question No.10. (Tables 1 & 2)

Figure 1: Box plot of gender differences in pre- and post-tests

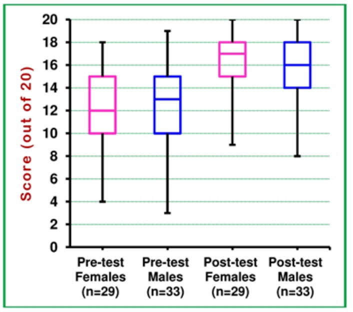

Table 1: Gender differences in cognitive domain scores (Pre-test)

Q. No.	Females (n=29)		Males (n=33)		Z value #	p value
	Mean	SD	Mean	SD		
1	2.61	0.58	1.06	0.66	9.843	<0.00001*
2	2.19	0.84	1.18	0.68	5.158	<0.00001*
3	3.17	0.82	1.36	0.93	8.144	<0.00001*
4	2.16	0.99	1.39	0.93	3.143	0.002*
5	1.37	0.89	0.61	0.79	3.535	0.0004*
6	3.70	0.38	1.88	0.42	17.911	<0.00001*
7	2.43	0.83	1.48	0.67	4.915	<0.00001*
8	1.92	0.85	1.30	0.59	3.292	0.001*
9	1.68	0.98	0.58	0.87	4.646	<0.00001*
10	1.79	0.62	1.79	0.60	...	...

SD = Standard deviation # Standard Error of difference between two means

* Statistically significant

Table 2: Gender differences in cognitive domain scores (Post-test)

Q. No.	Females (n=29)	Males (n=33)	Z value #	p value		
	Mean	SD	Mean	SD		
1	3.03	0.57	1.27	0.67	11.175	<0.00001*
2	3.47	0.45	1.67	0.48	15.232	<0.00001*
3	2.77	0.73	1.52	0.62	7.214	<0.00001*
4	3.48	0.70	1.64	0.78	9.789	<0.00001*
5	2.54	0.87	0.79	0.86	7.945	<0.00001*
6	3.70	0.47	1.91	0.29	17.753	<0.00001*
7	3.39	0.54	1.70	0.53	12.403	<0.00001*
8	3.16	0.69	1.42	0.61	10.456	<0.00001*
9	3.48	0.71	1.79	0.60	10.047	<0.00001*
10	2.00	0.00	2.00	0.00	...	...

SD = Standard deviation # Standard Error of difference between two means

* Statistically significant

DISCUSSION

In the present study, the overall mean scores (out of 20) in the post-test were significantly higher (Z=6.663; p<0.0001) than that obtained in the pre-test. Similar results have been obtained by other researchers.[13-16] The emphasis on TDLs, inadequate integration of course material and unsatisfactory coordination between the departments teaching basic and clinical sciences has beleaguered medical education in the existing Indian scenario. Repetition of the same topics by teachers of various departments results in wastage of time and efforts. Defining the core curriculum, sequencing content, faculty interest and capability, and interdisciplinary integration are among the challenges of integrated teaching. [17,18]

In the present study, female students obtained significantly higher mean scores in both the pre- and post-tests. (Tables 1 & 2) Gender differences in learning styles have been reported by other researchers.[19,20] Teachers can develop appropriate learning approaches to suit the learning style preferences of students, thereby increasing student motivation and performance. [21]

This study was conducted on only one batch of 62 first-year medical students. Due to the time constraints of the first-year MBBS course, follow-up could not be done to determine the retention of cognitive domain skills among the participants. A larger study on integrated teaching would be necessary in order to generalize the results.

CONCLUSION

Integrated teaching significantly increases cognitive domain scores. In spite of time constraints in the teaching schedule for first-year medical students, it is possible to conduct integrated teaching.

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