

## RESEARCH ARTICLE

### Effectiveness of pre- and post-test model of learning among MBBS students - An evaluative study

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#### ABSTRACT

**Background:** Effect of pre- and post-testing states that when the students are given a test for specific content, they remember it better and for longer period of time than the content not tested at all. Tests not only strengthen the memory by retrieving the information but also improve the learning of contents through long-term retention of specific information. **Aims and Objectives:** The aims and objectives of this study were to find out effect of pre- and post-test model of learning among medical students. **Materials and Methods:** This study was conducted in Gulbarga Institute of Medical Sciences, Kalaburagi during the month of February 2017. The study participants were 1<sup>st</sup>-year MBBS students of academic year 2016–2017. A total of 147 students were included in the study out of which 91 and 56 were boys and girls, respectively. The pre-test and post-test contained 10 questions and 1 score was given to each correct response. **Results:** There was significant improvement ( $P < 0.0001$ ) in post-test correct responses compared to pre-test correct response among study participants. 35.37% of study participants were moderate performers who were increased to 80.95% in post-test. There was no high performer student in pre-test but in post-test 19.05% students performed at high level. **Conclusion:** Introduction of pre- and post-test while taking lecture for particular topic help the students to learn more effectively and remember important aspects in a better way.


**KEY WORDS:** Pre-test; Model of Learning; Correct Responses; Effectiveness

#### INTRODUCTION

Teaching in medical field is demanding and complex task. Changes and modifications occur in medical education from time to time, so it is necessary for the today's teacher to aware of it, as well as become part of it. The changes shift from the conventional role of teacher, changes in learning styles, newer, and innovative curriculum models and changes in assessment, philosophy, methods, and tools.<sup>[1,2]</sup>

The educational background of the medical students vary from student to student, so it will create heavy burden on the undergraduate medical teachers especially 1<sup>st</sup> year as they need to acknowledge diverse learning style among the students and to design different teaching strategies which will motivate the students and helps in improving their academic performance.<sup>[3]</sup>

With continuous improvements and technologies in the medical education, various other instructional methodologies such as small group discussions (SGD), problem-based learning, simulation-based learning, and web-based learning, have been adopted to promote active learning among the undergraduate medical students.<sup>[4,5]</sup> Lectures are considered most economical, feasible and an equally effective method of imparting knowledge to a large group of students especially at undergraduate level at a single time.<sup>[6]</sup> However,

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at the same time, lectures are teacher-centered process with less involvement of students as they are passive learners with minimum evaluative as well as analytical power. Hence, it becomes important to assess whether learning objective has been achieved or not. Testing evaluates what the students have learned, and it helps to improve long-term memory. Hence, nowadays multiple choice questions (MCQs) are used as a tool of assessment. MCQs helped in better understanding of the topic as well as retention of knowledge and information acquired from the classes. For directing, the students in a scrupulous manner valuation techniques have a significant impact.<sup>[7]</sup> However, few researchers believe that lecture is a less effective teaching tool and provides passive environment for learning.<sup>[8-10]</sup>

As per Medical Council of India regulations teaching as well as learning methods should be student-centric. To become a lifelong learner student should be made competent and he should committed to continuous improvement of skills and knowledge. In the curriculum of medical students learning experiences such as SGD, patient care scenarios, workshop, seminars, role plays, and lectures should be incorporated.<sup>[11]</sup>

Effect of pre- and post-testing states that when the students are given a test for specific content, they remember it better and for longer period of time than the content not tested at all.<sup>[11]</sup> Tests not only strengthen the memory by retrieving the information but also improve the learning of contents through long-term retention of specific information. This phenomenon is known as test-enhanced learning (TEL).<sup>[12]</sup>

There are very few studies which depict advantages of TEL that is giving MCQs as a pre- and post-test in cognitive psychology, its effectiveness as a learning tool in undergraduate teaching situations such as lectures. Therefore, this study was conducted to determine the effectiveness of pre- and post-test as a learning tool in lectures for undergraduate medical students in physiology subject.

## MATERIALS AND METHODS

This study was conducted in Gulbarga Institute of Medical Sciences, Kalaburagi during the month of February 2017. The study participants were 1<sup>st</sup> year MBBS students of academic year 2016–2017. A total of 147 students were included in the study out of which 91 and 56 were boys and girls, respectively. Nature and objectives of the study well explained in front of Ethical Committee of the Institute and study were started after obtaining their approval. Informed verbal consent was obtained from all students who were participated in the study. The regular didactic lecture for the first MBBS class in physiology was modified and restructured with the introduction of a pre-test before the lecture and a post-test at the end of the lecture. The pre-test and post-test which were given to study participants contained 10 questions with 4 responses to each question, covering the key points pertaining

to the lecture to be delivered on errors of refraction and color vision. The questionnaire was pre-designed and pre-tested to ensure understanding of the items, wording, and adequacy of the response. For each right answer, 1 mark or score was given. The scoring system was adopted to analyze response, study participants with score <5 were considered as a low recipient, scores between 5 and 8 as moderate recipients, and scores more than eight as high recipients. Duration of 10 min was provided to answer questions of both pre- and post-test individually. The questions for pre- and post-test were (1) inability to see the distant object is called. eye defect, (2) myopic eye is corrected using., (3) long sightedness is also called., (4) in hypermetropia anteroposterior diameter of the eyeball., (5) the condition in which two eyes have unequal refractive error is called., (6) cylindrical lens used to correct which type of refractive error., (7) in protanopia which color cannot be appreciated., (8) out of the following which test is not used for color blindness, (9) central scotoma occurs in which condition of color blindness, and (10) condition of dichromatism in which there is defect in the receptor of third primary color is called. The lecture was delivered for about 40 min, following which, a post-test consisting a similar set of questions as the pre-test was given to the students.

## Statistical Analysis

For comparing pre- and post-test scores, Paired Student's *t*-test was used while for comparing the perceptions of male and female students unpaired Student's *t*-test was used and *P* values were calculated using SPSS 21. *P* < 0.05 was considered as significant with confidence interval of 95%.

## RESULTS

Table 1 shows a total of 147 1<sup>st</sup> year MBBS students participated in pre- and post-test. Total post-test correct responses were increased than pre-test, and this difference was found highly significant (*P* < 0.0001).

**Table 1:** Pre- and post-test response of the study participants (*n*=147)

Question number	Correct response		Paired <i>t</i> -test result
	Pre-test	Post-test	
1.	124 (84.35)	146 (99.31)	<i>t</i> =12.55 df=9 <i>P</i> ≤0.0001
2.	89 (60.54)	147 (100.0)	
3.	76 (51.70)	139 (94.56)	
4.	67 (45.57)	115 (78.23)	
5.	43 (29.25)	108 (73.47)	
6.	39 (26.53)	89 (60.54)	
7.	69 (46.94)	113 (76.87)	
8.	83 (56.46)	141 (95.92)	
9.	37 (25.17)	97 (65.99)	
10.	43 (29.25)	111 (75.51)	

Figures in parenthesis indicate percentage

Table 2 shows 91 male students participated in present study. There is highly significant difference between pre- and post-test scores with paired *t*-test value 7.984 and  $P < 0.0001$ .

Table 3 shows 56 female students participated in the present study. There is highly significant difference between pre- and post-test scores with paired *t*-test value 8.840 and  $P < 0.0001$ .

Table 4 shows categorization of study participants according to their pre- and post-test scores. About 64.62% of students were low performers in the pre-test and not a single student performed low in post-test scores. 35.37% of study participants were moderate performers who were increased to 80.95% in post-test. There was no high performer student in pre-test but in post-test 19.05% students performed at high level.

Table 5 shows that there was no significant difference between pre-test responses of male and female study participants with unpaired *t*-test value 1.007 and  $P = 0.3274$ .

Table 6 shows that there was no significant difference between post-test responses of male and female study participants with unpaired *t*-test value 0.2188 and  $P = 0.8293$ .

## DISCUSSION

The present study was conducted with the objective of whether pre-test is given before lecture improved performance of the students in post-test given after lecture. There was a significant improvement in the scores of participated students from

**Table 4:** Pre- and post-test scores of study participants

Scores	<i>n</i> =147	
	Pre-test scores	Post-test scores
<5 (low performers)	95 (64.62)	Nil
5–8 (moderate performers)	52 (35.37)	119 (80.95)
>8 (high performers)	Nil	28 (19.05)

Figures in parenthesis indicate percentage

**Table 2:** Pre- and post-test response of the male participants (*n*=91)

Question number	Correct response		Paired <i>t</i> -test result
	Pre-test	Post-test	
1.	81 (89.01)	91 (100.0)	<i>t</i> =7.984 df=9 $P \leq 0.0001$
2.	73 (80.21)	87 (95.60)	
3.	65 (71.42)	83 (91.21)	
4.	58 (63.74)	70 (76.92)	
5.	37 (40.66)	65 (71.42)	
6.	27 (29.77)	59 (64.83)	
7.	52 (57.14)	72 (79.12)	
8.	63 (69.23)	87 (95.60)	
9.	25 (27.47)	58 (63.74)	
10.	39 (42.86)	72 (79.12)	

Figures in parenthesis indicate percentage

**Table 5:** Comparison of pre-test responses between male and female study participants

Question number	Correct response of pre-test		Unpaired <i>t</i> -test result
	Percentage of males	Percentage of females	
1.	89	82	<i>t</i> =1.007 df=9 $P=0.3274$
2.	80	89	
3.	71	48	
4.	64	43	
5.	41	27	
6.	30	29	
7.	57	45	
8.	69	54	
9.	27	27	
10.	43	29	

**Table 3:** Pre- and post-test response of the female participants (*n*=56)

Question number	Correct response		Paired <i>t</i> -test result
	Pre-test	Post-test	
1	46 (82.14)	55 (98.21)	<i>t</i> =8.840 df=9 $P \leq 0.0001$
2	50 (89.29)	56 (100.0)	
3	27 (48.21)	52 (92.86)	
4	24 (42.86)	44 (78.57)	
5	15 (26.79)	33 (58.93)	
6	16 (28.57)	35 (62.50)	
7	25 (44.64)	42 (75.00)	
8	30 (53.57)	53 (94.64)	
9	15 (26.79)	37 (66.07)	
10	16 (28.57)	43 (76.79)	

Figures in parenthesis indicate percentage

**Table 6:** Comparison of post-test responses between male and female study participants

Question number	Correct response of post test		Unpaired <i>t</i> -test result
	Percentage of males	Percentage of females	
1.	100	98	<i>t</i> =0.2188 df=9 $P=0.8293$
2.	96	100	
3.	91	93	
4.	77	79	
5.	71	59	
6.	65	62	
7.	79	75	
8.	96	95	
9.	64	66	
10.	79	77	

pre- to post-test. There was no any significant difference in performance of study participants with respect to their gender.

Correct responses for each question were measured in both pre- and post-test and same was compared with paired *t*-test shows highly significant difference between pre- and post-test responses with  $P < 0.0001$ . Similar findings showed by study conducted by Shivaraju *et al.*,<sup>[13]</sup> Behera *et al.*,<sup>[14]</sup> and Lakshmikandhan.<sup>[15]</sup> Findings of the present study stated that there was highly significant difference between pre- and post-test scores in both male and female participants with  $P < 0.0001$ . Similar findings observed by Shivaraju *et al.*<sup>[13]</sup> and Lakshmikandhan<sup>[15]</sup> in their studies. Findings of table number 4 say about 64.62% students were low performers in pre-test and not a single student performed low in post-test scores. 35.37% of study participants were moderate performers who were increased to 80.95% in post-test. There was no high performer student in pre-test but post-test 19.05% students performed at high level. Shivaraju *et al.*<sup>[13]</sup> in his study also finds out the same results. There was no significant difference found between pre-test and post-test responses of male and female study participants with  $P = 0.3274$  and  $0.8293$ , respectively, in the present study.

### Strengths of the Study

Significant improvement has been observed in post-test scores with no gender difference was found in scores. Hence, we found the introduction of pre- and post-test helpful for the students for better understanding of the said topic and to arouse more interest as well as concentration during lecture.

### Limitations of the Study

To validate results more precisely large number of students should be included and further, it was not possible to introduce pre- and post-test in undergraduate practical's and demonstrations and other curriculum.

### CONCLUSION

On the basis of findings of the present study, it was clear and evident that introduction of pre- and post-test found useful for the students to remember and understanding of said topic more effectively. It will help them in precise and to the point learning and achieve good results in future exams.

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