Traditional Continuous Didactic Lectures Verses Reinforcement Methods in Between the Lecture: Comparing the Outcome of the Class

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Abstract

Introduction: Medical education needs compulsory attendance in lectures where, attention becomes challenging. The objective was to compare outcome of a class conducted with traditional continuous didactic lecture compared to intermittent rest and music as reinforcement methods used in between the class.

Materials and Methods: After completing all formalities, 3 afternoon classes were chosen for physiology topics that were challenging to grasp. For the first 2 classes, 62 1styear physiotherapy students were randomised into 2 groups equally i.e. music and rest group. In the 1st lecture, 30 min was conducted as didactic lecture then, 5min reinforcement of rest to one group and short self-chosen music through ear phones to the second group was given. After this, class was continued. 2nd lecture was similar as 1stexcept the groups were reversed. The 3rdlecture acted as a control i.e. without reinforcements. For all 3 lectures, 10 multiple choice questions were given as pre and post-test. Difference between pre and post-test was calculated to assess improvement.

Results: All students were part of all 3 groups. With rest and music, 51.61% and 67.74% students showed better post-test and difference score respectively. The rest group showed highest post-test mean (6.19±2.05) and difference score (2.68±2.3). Mean of control group was slightly better than music group. No significant difference was obtained in Pearson's correlation and between means of all 3 lectures.

Conclusion: Five minutes reinforcement sessions of rest or music between the lecture might help to break the monotony but listening to music might deviate their concentration more than required.

Keywords: Reinforcements; Concentration; Didactic Lecture; Music; Performance

Introduction

The search for a way of conveying the curriculum to boost student learning and application of learned concepts is an open-ended process [1]. Didactic lecture is one of the popular teaching methodologies, for communicating conceptual knowledge; when there is a substantial knowledge gap between the lecturer and audience [2] in mass,

systematically and in a short time. There are advantages that attending didactic lectures help in developing professional relationships, companionship, a sense of belonging, and other elements of social behaviour, which are crucial for the development of young doctors and this also gives a platform for faculty and staff to notice and recognize students who may be struggling in these areas [3] though there are few shortcomings of the lecture class, including its passive nature [4].

Medical education is a life-long process [5] where the graduates from various courses including physiotherapy have to undergo lot of training in many subjects, procedures, treatment modalities etc., in order to excel as health provider. Hence traditional didactic lecture can be enhanced by comprising many innovative, research-based methodologies shifting towards learner centered approach [6]. However, medical education needs compulsory attendance in lectures as it still remains a vital determinant of academic performance. A few studies have shown that, implementation of an attendance policy improves exam performance [7]. But at times holding attention of students becomes challenging in a lecture class particularly a difficult topic, during post lunch hours. There is various reinforcement methods studied and implemented in various institutions like problem-based learning, case-based learning, videos, quiz, seminars, small group teaching, simulations etc. [8]. However, for these activities the teachers need considerable amount of preparation, including making of groups, subgroups of students, lesson plan, collecting resource materials, man power, altering the teaching schedule etc. It takes a great deal of effort from the teacher's part to make it learner centered.

At the same time studies and training in medical/ physiotherapy colleges can be particularly stressful [9] in order to achieve academic excellence. Students can suffer from coping problems, anxiety or even depression. There are a few mind- body practices that can improve such psychological conditions including meditation, relaxation techniques etc., and thereby enhancing mindfulness [10]. Music is also one of the reinforcement approaches that can be used in the field of medicine. Although the association between music and health is very well established [11], there is some void in the understanding of role of music in medical education. In this background, our hypothesis is that music and rest can be used in between lectures to enhance the attention span of the students rather than a traditional didactic class. Hence the present study was conducted to compare the performance level of physiotherapy students after a traditional continuous didactic lecture and after music and rest in between the lecture as reinforcement methods.

Objective

- Assessment of performance of students after traditional continuous didactic lecture and reinforcements in between the lecture with music and rest.
- Comparison of the performance of students after traditional continuous didactic lecture and reinforcements in between the lecture with music and rest.

Materials and Methods

Study Design

Cross over Randomized controlled trial.

Study Subjects

1st year Physiotherapy students.

Inclusion Criteria

All 62 students of first year physiotherapy were included in the study.

Procedure

Informed consents from the participants were taken and Institutional ethical clearance obtained. For the study 3 afternoon classes between 2pm- 3pm were chosen for physiology topics that were challenging to grasp. For the first 2 classes, 62 1st year physiotherapy students were randomized into 2 groups equally i.e. music and rest group using odd-even method. In the 1st lecture the topic chosen was 'Autonomic Nervous System' 30 min was conducted as didactic lecture, followed by 5min reinforcement of rest (in silence) to odd group and short self-chosen music through ear phones to the even group was given. After this, class was continued for another 30 minutes. 2nd lecture topic was' Limbic system' and was similarly conducted as 1st lecture except the groups were reversed i.e. odd group was given self-chosen music and even group was given rest. The 3rd lecture was on the topic' cerebral cortex and speech' and was like control i.e. without reinforcements, a continuous didactic lecture for one hour. For all 3 lectures, 10 MCQs of one mark each were given as pre-test and post-test. Difference between pre-test and post-test was calculated to assess improvement.

Thus all 62 students participated in all three groups and acted as their own controls. For analysis, we have created 3 groups, having pre-test, post-test and the difference between the two test to show improvement levels in all three groups.
- Music group: reinforcement
- Rest group: reinforcement
- Control group: no reinforcement

Results

SPSS version 22 software was used for the data analysis. ANOVA, Paired t test and Pearson's correlation were applied.

Figure1: Average pre-test scores of all students for all three lectures.
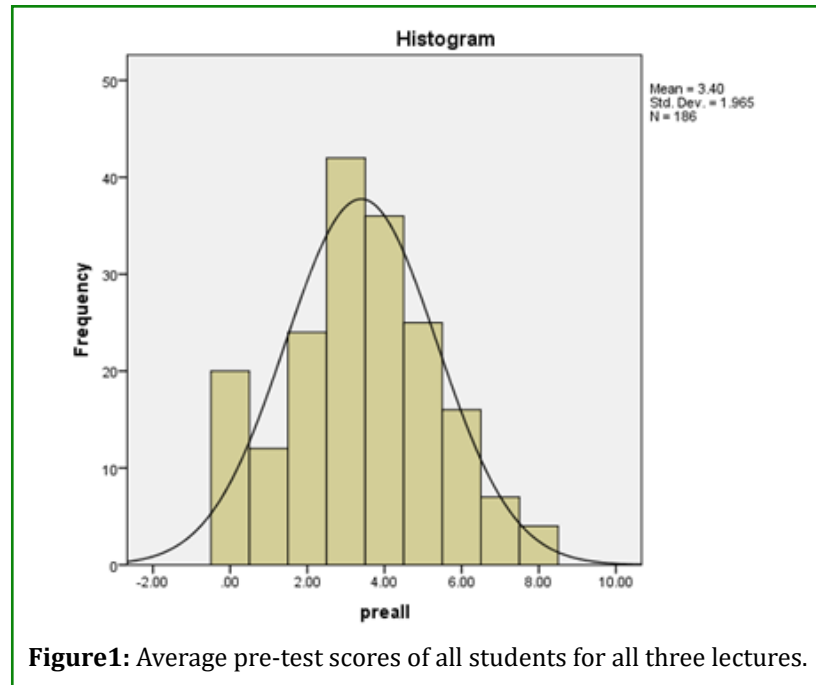
Histogram showing average pre-test scores of all 62 students for all three lectures combined. It shows majority students have an average of 3 of 10. Pre-test score is an average of all 3 pre-tests conducted, generating 62*3=186 scores.

All 62 students were part of all the 3 groups. The data was analyzed in three ways.

Intra Individual Analyses

Since all students were a part of all 3 groups, in which group the individual student showed best post-test performance was analyzed. With reinforcement (rest + music), 51.61% students showed better post-test and 67.74% students showed better difference score with reinforcement. (Table1)

Percentage of students	Music	Rest	Intervention (Total music+rest)	Control	No Change
Post Test	19.35%	24.19%	51.61%	30.65%	17.74%
Diff Score	22.58%	35.48%	67.74%	25.81%	6.45%

Table 1: Percentage of students who scored their own best post-test in music, rest and control groups.
* P value > 0.05 (not significant).

62 students were present in all 3 groups generating 3 post-test scores for each student. 19.35% students performed their own best in music group, while 24.19% students performed best while in rest group. Thus, a total of 51.61% showed best in post test scores after an intervention. While 30.65% students performed best during no intervention.

The difference score was also analyzed i.e. in which scenario students performed best in post-test compared to pre-test. It was seen that 35.48% students performed best when they were in rest group. 67.74% students showed highest difference score with an intervention.

Topic Wise Performance Analysis

In the lecture ANS the post-test and difference score (6.3 and 3.47 respectively) in rest group was better than the music group. Similarly, during the topic limbic system post-test and difference score (6.93 and 2.79 respectively) in music group was better when compared to rest group. And during the topic cerebral cortex and speech which was the control, the post test score was less compared to limbic system topic (6.45) and the difference score was less than both ANS and LS topics. The means of all the three lectures showed difference in scoring, but not statistically significant including Pearson's

correlation (Table 2).

	ANS		LS		CC and Speech
	Music	**Rest**	**Music**	**Rest**	**Control**
Post Test	5.59	6.3	6.93	6.5	6.45
Difference	2.39	3.47	2.79	2.07	2.48

Table 2: Average scores of 3 lectures conducted separately. Scores indicate average of 10 MCQs.
ANS- Autonomic Nervous System, LS- Limbic System, CC- Cerebral Cortex
 * p value > 0.05 (not significant)

Intra Parametric Analysis

Table 3 that is the music group, rest group and control group as a whole, irrespective of the topics. In this method, the rest group showed highest post-test mean (6.19±2.05) and difference score (2.68±2.3). Next, the mean of control group (no intervention group) was slightly better than was the music group which had least post- test score (Figure 2).

	Musicpost[1]	**Musicdiff**[2]	**Restpost**[3]	**Restdiff**[4]	**Controlpost**[5]	**Controldiff**[6]	**Preall**[7]
N in each group				62			186
Mean	5.48	2.4	6.19	2.68	5.82	2.24	3.4
Standard Deviation	2.73	1.89	2.05	2.3	2.47	2	1.97
Skewness	-0.671	0.185	-0.981	-0.144	-1.022	0.126	0.066
Standard Error of Skewness	0.304	0.304	0.304	0.304	0.304	0.304	0.178
Minimum	0	-1	0	-3	0	-2	0
Maximum	10	7	9	8	10	7	8

Table 3: Pre-test and average of post-test scores of music, rest and control groups.
1 Musicpost- post test score in music group.
2 Musicdiff- difference score in music group.
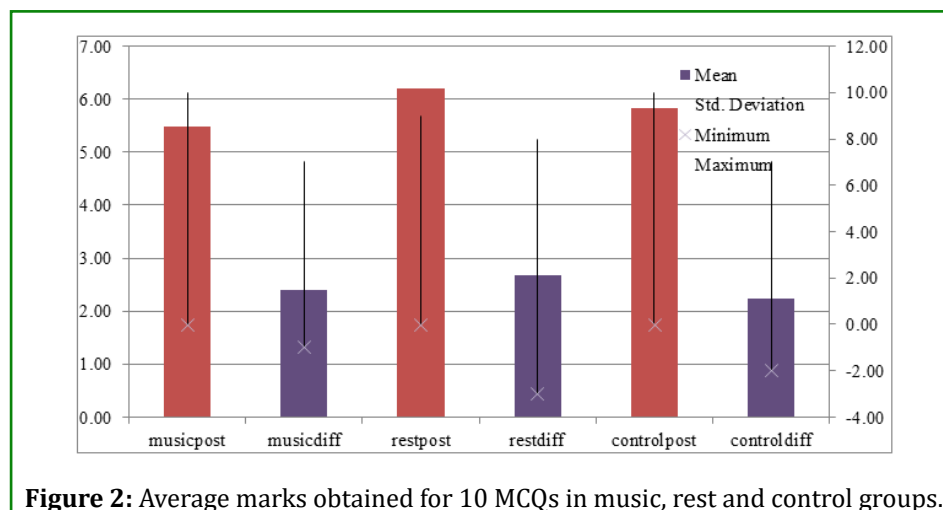3 Restpost- post test score in rest group.
4 Restdiff- difference score in rest group.
5 Controlpost- post test score in control group.
6 Controldiff- difference score in control group.
7 preall- pretest of all the groups.
* Scores indicate average marks out of 10 MCQs.

Figure 2: Average marks obtained for 10 MCQs in music, rest and control groups.

Musicpost- post test score in music group; Musicdiff- difference score in music group.

Restpost- post test score in rest group; Restdiff- difference score in rest group.

Controlpost- post test score in control group; Controldiff- difference score in control group.

Best post-test average and average of difference scores was seen in rest group.

Discussion

Medical education is exhaustive and a continuous process and students have to give their undivided attention during their training period. However, there would be certain topics/ lectures at times when it becomes difficult to keep up the same sort of attention and concentration, besides, the success of a class depends on the student's attention span [12]. The attention span is narrowing in this technology era due to the amount of information that is accessible to the students from various sources. Hence sustaining their attention during a lecture is vital because though it has its own limitations is extensively practiced worldwide.

It is now pivotal for the teachers to come up with some strategies to make the class ease and interesting. Hence the present study was done with the hypothesis that reinforcement methods can be used in between lectures to enhance the attention span of the students rather than a traditional didactic class for difficult and dry topics. The reinforcement methods used in the study were music and rest. Our study showed that the post-test and the difference scores were better with reinforcement. But when it came to analyze the performance within group the rest group performed better, then the control group and performance was low with the music group.

Listening to music is one of the most rewarding human experiences [13] and researchers associate the enjoyment of music to brain areas implicated in emotion and the dopaminergic reward system. In particular, dopamine release in the ventral striatum seems to play a major role in the rewarding aspect of music listening [14]. Studies have suggested that listening to Mozart's music, spatial reasoning skills got better compared to relaxation instructions or silence [15], the findings which is inconsistent with our study. This could be due to the reason that the students were instructed to listen to the music of their choice. Musical emotions are highly subjective and preferences for certain musical pieces or genres vary widely across individuals [16,17]. Some music will be soothing enough whereas some may be distractive which might be true in case of people who are introverts.

Mindfulness is the practice of sitting silent and focusing attention, feeling in the moment without interpretation or judgment whereas anxiety disturbs it and disrupts the learning process by exhausting the required energy. Our results are similar with some research studies which showed that relaxing techniques reduces tension and anxiety and shifts the attention from threatening environmental stimuli to the current task, widens the scope of attention and increases concentration on the task, thereby improving the working memory and academic performances of the students [18].

In conclusion reinforcement techniques can be safely included in the current teaching methodology to break down the monotony of the didactic lectures. Rest of five minutes duration in a one-hour lecture class helps in improving students attention and in turn their performance level. Similarly, music of five minutes duration in between the class does alleviate the mood as well as attention of the students but depending upon the genre of music they choose to listen, can deviate their concentration more than required.

Limitations

- More students could not be included for the study.
- The students were asked to choose music of their liking instead of a common genre.
- Reinforcement methods could not be continued in multiple lectures.

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