A New Teaching Approach in Basic Sciences: Peer Assisted Learning

Mohammadreza Abedini a *, Fathieh Mortazavi b, Seyed Alireza Javadinia a, Hossein Karimi Moonaghi c

a Medical Education Research center, Department of Pharmacology and Physiology, Birjand University of Medical Sciences, Birjand, Iran
b Educational Development Centre, Shaheed Beheshti University of Medical Sciences, Tehran, Iran
c Department of Medical Education, Faculty of Medicine, Mashhad University of Medical Sciences

Abstract

Studies on medical education suggest that Peer Assisted Learning (PAL) could be an acceptable and beneficial educational strategy to organize the programs by which students can tutor or teach their peers. The present study conducted in Birjand University of Medical Sciences to examine and compare the effects of two educational methods: Peer Assisted Learning and lecture on medical students learning and retention scores. This semi-experimental study was conducted on medical basic pharmacology teaching for students who divided in PAL and lecture groups based on demographic features through a block randomized sampling method. Data compiled using a questionnaire consisting of: a) 15 demographic questions and b) 30 multiple choice questions [knowledge level (15 questions), comprehension level (11 questions) and application level (4 questions)]. The teaching were carried out in eight sessions (1.5 hours each) for both groups who were attended the pre-test, immediate and also three months post-test without any prior notice. The student’s learning and retention determined by subtracting of pre-test and immediate post-test scores, as well as immediate post-test and three months post-test scores after teaching, respectively. Paired t-test and t-test were used for assessing effectiveness of educational methods. The study demonstrates: a) both methods increase learning scores (p<0.001); b) PAL learning scores significantly are higher than lecture in overall and knowledge level (p<0.02) as well as comprehension and application levels (p<0.001); c) PAL retention marks are dramatically higher compared with lecture in overall (P<0.001), comprehension and application levels (P<0.02); but not in knowledge level (P>0.05). These findings support the notion that PAL is more effective than lecture on student’s learning and retention, specifically in comprehension and application levels. PAL could be an effective mean to encourage students and improve their knowledge and performance in basic sciences.

© 2013 The Authors. Published by Elsevier Ltd. Open access under CC BY-NC-ND license.
Selection and/or peer-review under responsibility of Prof. Dr. Hafize Keser Ankara University, Turkey

Keywords: Peer Assisted Learning, PAL, Medical Education
1. Introduction

Educational institutes aim to provide a program for preparing students with appropriate knowledge, skills and attitudes. The training program should enable trainees to act with a high level competency and performance when they encounter the real situations in workplaces (Wadoodi, Crosby, 2004). Therefore it is important that the educational program applies appropriate teaching strategies to reach this goal. Universities and colleges are intensively using traditional teaching methods which students more often memorize the educational contents, and usually forget them easily after a short period of time. Lecture is one of the most common traditional methods which have been extensively applied in the medical faculties. It is well accepted that the teaching methods which mostly rely on teachers like lecture do not have enough efficacy, and students benefit in less extent from auditory learning style such a lecture (Kenyon, Peckover, 2008). In the last decades, numerous teaching methods have been introduced to fill the gap in the field of medical education. Universities recently offer more innovative and flexible educational methods which optimize the condition for providing better educational atmosphere (Currens, Bithell, 2003). Many new innovative strategies such as Problem Based Learning (PBL) (Macallan, 2009; Wood, 2003), Puzzle Based learning (Michalewicz, Falkner, 2010), small group teaching (Steinert, 2004; Dennick, Spencer, 2011), as well as Team Based Learning (TBL) (Clark, 2008; Koles, 2010) have been applied to overcome the learning difficulties. Moreover, Peer Assisted Learning (PAL) has been also recently used by many medical universities in their education frameworks (Wotton, Gonda, 2004). PAL could be one of the most efficient educational strategies by which students are actively involved in the teaching process (Perry, 2010; Peets, 2009). Topping et al has introduced PAL as an innovative teaching method for the first time in 1998 (Topping, 1998). Thereafter, PAL application has been extended by different educational researchers for many years (Trottier, 1999; Orsmond, Merry, Reiling, 2000; Elliott, Higgins, 2005).

Peer-assisted learning has become an important teaching strategy among medical education specialties in different stages (Arthurs, 2007). From the student’s point of view, PAL is a collaborative and cooperative learning strategy which offers variety of advantages such as close interaction between tutee and tutor. This close relationship could facilitate group discussion which may not easily happen in the presence of established faculty staff and formal teaching atmospheres. The teaching activity by itself can improve tutor’s understanding from the syllabus and thereby provide them an opportunity to gradually increase their self confidence (Perry, 2010; Peets, 2009) and enable them to promote their communication skills required for better teaching as new educators (Erickson, 1987; Dandavino, Snell, Wiseman, 2007; Ten Cate, Durning, 2007). It has been predominantly reported that both tutees and student-tutors greatly enjoy from PAL programs (Topping, 1998). Peer student trainers are basically more approachable by the trainees and often more familiar with their subjects and courses compared to some professors. Moreover, they could readily integrate new learning experiences into the curriculum context (Peets, 2009; Topping, 1998). A growing body of evidence show that students enjoy and value learning from other students, reduce their psychological pressure (Erickson, 1987) through group discussion, and thereby improve their learning (Elliott, Higgins, 2005; Parr, 2002), as they work together in groups. Despite the wide application of PAL in different medical schools, few studies have elucidated the outcomes of such a strategy in tutees competency and performance. Moreover, whether and how this active teaching method is comparable with traditional strategy in medical education fields is not clear. The present study has been conducted to better understand the effectiveness of PAL in medical education and specifically its impact on medical student’s learning and retention in basic pharmacology and it’s comparing with lecture method in Birjand University of Medical Sciences.

2. Material and Method:

Study design:

This is a semi-experimental study which examines the learning and retention outcome of the third year medical students who were participated (n=36) in the study, and divided in two groups (PAL and Lecture) through a block randomized sampling method according to the demographic characteristics as shown in table 1. First, all students participated in a pre-test before educational session. Then, students attended in eight educational sessions which
took 90 minutes each. In the PAL group, students divided in several sub-groups consist of 3-5 students. They have received the basics pharmacology objectives and resources at least one week before of the sections. In each session, one student per group has been chosen as tutor and the rest of the group attended at the discussion and shared their ideas when it was needed. The professor attended at the groups, only as a facilitator. In the lecture group, the professor taught the same subjects in eight 1.5-hours for the whole group at the same time. Immediately after educational sessions, student's knowledge in both groups was evaluated using a multiple choice questions (MCQs) post-test.

Data collection and assessment of learning and retention:
A questioner was used to collect the demographic data including student’s gender, age, accommodation type and the basic science comprehensive marks. Second questionnaire was applied to assess students’ knowledge about basic pharmacology consists of 30 multiple choice questions (15 questions for knowledge, 11 questions for comprehension and 4 questions for application level). Student’s learning scores were assessed by subtracting their pre-test from post-test marks. The post-test has been repeated 3 months after education without any prior notice and the student’s retention scores were calculated from the difference between immediate post-test and 3 month thereafter post test.

Data analyzing:
SPSS software version 11 was used for the data analysis. Paired t-test and t-test have been used for comparing effects of PAL and lecture on learning and retention intra and inter groups, respectively.

3. Results
Thirty two students attended in the study and sixteen students participated in each group (PAL and lecture). Demographic feature in both group have been shown in table 1 and there was no significant difference between two groups. Students' pre-test marks in PAL group were significantly lower than lecture group (7.1±1.9 Vs 8.9±2.4, P<0.01). Although both teaching methods increased learning level, learning level in PAL group was higher than lecture group (11±2.7 Vs 8.5±2.9, P<0.02). Table 2 shown the effects of educational methods on learning status. This difference was significant in all learning levels including knowledge, comprehension and application. Marks obtained from 3 months post-test reduced in both groups. As shown in table 3, in the PAL group, marks reduction was significantly lower than the lecture group (-1.4 ± 0.5 Vs -2.3 ±1, P<0.01). Data have been shown in table 3. Dramatically, these reductions in all learning levels were lower in the PAL group except in the knowledge level.

4. Discussion
The present study shows that peer assisted learning strategy is more effective on the students’ learning and retention than lecture. These differences were more evident in the comprehension and application levels. In the other word, for teaching of the comprehension and application domains, PAL strategy could be more beneficial than traditional teaching methods. These findings support the study conducted by Trottier et al (Topping 1998). Positive criteria towards PAL strategy results in enhanced learning and retention level thereby cause persuasion for students to study harder.
5. Tables

Table 1, Demographic features of students

<table>
<thead>
<tr>
<th>Variables</th>
<th>PAL (N=16)</th>
<th>Lecture (N=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>21.9±1.1</td>
<td>21.1±1.1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>9(56.2%)</td>
<td>9(56.2%)</td>
</tr>
<tr>
<td>Men</td>
<td>7(43.8%)</td>
<td>7(43.8%)</td>
</tr>
<tr>
<td>Place of resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>House</td>
<td>4(25%)</td>
<td>4(25%)</td>
</tr>
<tr>
<td>Dormitory</td>
<td>12(75%)</td>
<td>12(75%)</td>
</tr>
<tr>
<td>Comprehensive exam’s mark</td>
<td>132.4±14.8</td>
<td>137±24</td>
</tr>
</tbody>
</table>

Table 2, Effects of PAL and Lecture methods on learning level

<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Pre-Test mark</th>
<th>Post-Test mark</th>
<th>Learning Diff. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>8.9±2.4</td>
<td>17.9±1.9</td>
<td>8.5±2.9 (95.5%)</td>
</tr>
<tr>
<td>PAL</td>
<td>7.1±1.9</td>
<td>18.1±1.5</td>
<td>11±2.7 (155.9%)</td>
</tr>
<tr>
<td>Difference (%)</td>
<td>-1.8(-20.2)</td>
<td>0.7(4)</td>
<td>2.6(29.4%)</td>
</tr>
<tr>
<td>P value</td>
<td>&lt;0.01</td>
<td>N.S.</td>
<td>&lt;0.02</td>
</tr>
</tbody>
</table>

Table 3, Effects of PAL and lecture methods on retention level

<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Post-Test mark</th>
<th>3 Month Post-Test mark</th>
<th>Retention Diff. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>17.4±1.9</td>
<td>15.1±1.6</td>
<td>-2.3±1 (-13.2%)</td>
</tr>
<tr>
<td>PAL</td>
<td>16.7±1.5</td>
<td>16.7±1.5</td>
<td>-1.4±0.5 (-7.7%)</td>
</tr>
<tr>
<td>Difference (%)</td>
<td>0.7 (4)</td>
<td>1.6(10.6)</td>
<td>0.9(39%)</td>
</tr>
<tr>
<td>P value</td>
<td>N.S.</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

6. Acknowledgements

Authors would like to thank all medical students participants in the study.

References:


