Original Article

Comparison between the Effect of Lecture and Question - answer Methods on Learning Outcome and Satisfaction of Physiology Course among Medical and Pharmacy Students

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Abstract

Introduction: Considering the efficiency of active teaching methods, current study is designed to compare the effect of lecture and question-answer methods on learning outcome and satisfaction of physiology course among medical and pharmacy students.

Methods: In this semi-experimental study, medical and pharmacy students which have been registered in physiology course, divided randomly into two groups. Some topics of physiology with the same content were taught for both groups. The difference was that in the test group, question-answer method was used. In the next meeting, test and control groups were displaced and the same test was performed for all students at the end of each session. Totally, 8 sessions run in this way and the average test scores in two groups were compared. We used a questionnaire to compare the student opinion about these two methods. Content validity of the questionnaire was determined and its reliability was calculated by using Cronbach's alpha.

Results: The results showed that the mean percentage of correct answers to final exam questions in test groups of medical (78±2.06%) and pharmacy students (55.02±3.89%) was significantly greater than control groups (65±2.64%, 42.41±3.22% respectively) with P value of 0.0001 and 0.018, respectively. More than 90% of students preferred this method to the traditional method.

Conclusion: Our findings showed that using simple active question-answer method would increase students' satisfaction and learning outcome at physiology course. Thus, we recommend using of this method for education of other basic science courses.

Keywords: Lecture, Teaching methods, Medical students, Pharmacy students.

Introduction

Emile Durkheim believed that education is changing, parallel to changes in society, and basically, the principal function of education is development of capabilities and potentials the society requires (1). It has been proposed that not only learning itself but also learners' career qualifications are associated with teaching method (2). Thus, with regard to current regular changes in the requirements of the society, it is suggested that medical education should also change (3). Regarding the high applicability of active teaching methods, their application in various studies has been emphasized. It has already shown that application of some active methods such as small group discussion (4) and problem solving teaching method (5, 6) increases students' satisfaction and their learning outcome compared to common lecture methods.

Despite the high efficiency of active methods, this method has been used insufficiently, and most of the teachers make use of passive teaching methods (7). Active teaching methods mainly require more time and are appropriate for less populated classes (4, 8). Currently, many teachers believe that large amounts of materials along with limited time and large number of students are obstacles to application of active teaching methods. To solve this problem, using active teaching methods that do not require much time can be a proper substitute. One of the appropriate options for this is question-answer teaching method (9) which is considered as an active teaching method (10, 11) and is applicable to classes with large number of students in a time period equal to lecturing method.

In general, this method can, in the one hand, enhance learning process via active participation of the students compared to traditional methods (12-15), and on the other hand, does not require a long time or limited population. Since there is not much knowledge about the effect of this method on students' satisfaction and learning process of medical basic science courses along with the importance of the matter in hand, the present study was conducted.

Methods

In this quasi-experimental research, study population included 78 sophomore medical and pharmacy students at Kermanshah University of Medical Sciences. These students had been registered physiology course (II) in the second semester in 2010 and were chosen using census method. Students in each class were classified into two groups according to the last digits of their student number; students with even number were

categorized in one group and those with odd number categorized in another group. Some subjects of nerve physiology, including neurons electric events in the relaxed, excitation, and inhibition potentials, dendrites' electrical features, various anthropometric senses, physiology of touch receptors and their accordance, physiology of sensory anthropometric cortex of brain and its various layers, physiologic function of pain and its types, differences of visceral and somatic pain, pathways of pain transmission, referred pain, physiology of thermal receptors and mechanism of their function and accordance were taught to these students through lecture method (in control group) and question-answer method (in experimental group). Teaching was performed by one full-time faculty member based on the syllabi and the same time period of 70 minutes for each session in both groups.

In question-answer teaching method, at the beginning of the class some papers were given to students specified with a list of subjects and relevant lesson plan of the session as well as blank spaces for response to the questions. The power points of lecture sessions were used in this group except that some slides containing questions of the taught materials were shown alternatively with the intervals of 5-10 minutes, and students were given time to answer questions in the papers. The results of the given answers by the students were announced consequently in subsequent sessions. In the end of each session, in order to assess the learning level of the taught materials, a test was given to both lecturing and question-answer groups and scores were determined based on the number of correct responses compared to all questions.

In the following sessions, students were alternatively changed in the groups; students who were taught the previous subject through lecture method were taught the next subject via question-answer method and vice versa. Therefore, two groups of students of the same class were taught the same materials using two different methods. In the next session, the students were changed so that all of them experienced both teaching methods. Thus, comparison of the two teaching methods was made possible by matching different groups; each of the groups was investigated alternatively as control and experimental which provided a proper analysis. Two topics of nerve physiology were taught to medical students and another two topics to pharmacy students (in both control and experimental groups) in eight sessions. Moreover, students were provided with a questionnaire to complete in order to compare the two teaching methods. One month after the time that materials were taught, a similar test was given to various groups without being informed previously in

order to evaluate the retention of the materials being taught. Data were analyzed using SPSS software version 16. Independent sample t-test was used to compare the means of scores and percentage of correct responses. Further, Cronbach's alpha was calculated for the questionnaires' data indicating the acceptable reliability index of 80%. Content validity was used to evaluate the validity of the questionnaire. The questionnaire was confirmed by experts after being assessed by some authorities in the field. Data were presented as Mean ± SEM and P value less than 0.05 considered as significant.

Results

In this study we found that mean scores and percentage of correct responses in experimental groups of medical (Table 1) and pharmacy students (Table 2) were significantly higher than those of control groups (P value=0.018 and 0.0001, respectively). This means

learning outcome in question-answer was higher than that of lecture method, while teaching was the same for both groups according to the time and content. To evaluate the retention of the materials being taught, we administered re-tests with one month regular interval. The results indicated that, only in one of the sessions, the mean scores in experimental group was higher than that of the control group resulting in the change from 2.36 ± 0.27 in the first test to 1.57 ± 0.2 in the test with one month interval, while in experimental group this change was from 3.12 ± 0.37 to 2.93 ± 0.33 which indicated a significant increase compared to control group (P value=0.001). There was not a significant difference, however, regarding the other sessions. The results of the questionnaire on the comparison of the two teaching methods indicated that 90% of the students reported student's attention, understanding the materials, and usefulness of sessions via question-answer method as "much" or "very much" in comparison with lecture method (Table 3).

Table 1- Comparison of the result of tests at the end of teaching sessions based on means of scores and percentage of correct responses in lecture (control) and question-answer (experimental) groups for medical students (Mean ± SEM)

Group	Control group (lecture)			Experimental group (question-answer)			
Sessions	Number	Mean of scores	Percentage of correct responses	Number	Mean of scores	Percentage of correct responses	P value
First session	35	3.88±0.27	48.57±3.46	36	5.75±0.26	71.87±3.35	0.0001
Second session	39	7.97±0.19	79.74±1.96	38	8.44±0.2	84.47±2.05	0.1
Total	74	6.04±0.29	65±2.64	74	7.13±0.23	78.34±2.06	0.0001

Table 2- Comparison of the result of tests at the end of teaching sessions based on means of scores and percentage of correct responses in lecture (control) and question-answer (experimental) groups for pharmacy students (Mean ± SEM)

Group	Control group (lecturing)			Experimental group (question-answer)			
Sessions	Number	Mean of scores	Percentage of correct responses	Number	Mean of scores	Percentage of correct responses	P value
First session	14	2.36±0.27	39.28±4.49	17	3.12±0.37	51.96±6.21	0.123
Second session	14	3.64±0.37	45.53±4.65	17	4.65±0.38	58.08±4.78	0.07
Total	28	3±0.25	42.41±3.22	34	3.88±0.29	55.02±3.89	0.018

Table 3: Results of questionnaires for medical and pharmacy students on the comparison of lecture and question-answer teaching methods

In your opinion, what is the difference between the sessions held through question-answer method and other sessions of nerve physiology course?		Very low	Low	Equal	More	Much more	Total (Number)
1. Student's attention in question-answer method is ………….. than that of other sessions.	Percentage	0	0	1.8	36	62.2	
	Number	0	0	2	40	69	111
2. Learning of materials in question-answer method is ………….. than that of other sessions.	Percentage	0	0	0.9	54.5	44.6	
	Number	0	0	1	61	50	112
3. Student's follow-ups of the presented materials via question-answer method is ………….. than those of other sessions.	Percentage	0	1.8	15.2	42.9	40/1	
	Number	0	2	17	48	45	112
4. Student's tiredness in question-answer method is ………….. than that of other sessions.	Percentage	18.1	52.2	13.5	10.8	5.4	
	Number	20	58	15	12	6	111
5. Generally, usefulness of sessions in question-answer method is ………….. than that of other sessions.	Percentage	0	0	0.9	45.5	53.6	
	Number	0	0	1	51	60	112
6. Number of sessions using question-answer method during the term should be ………… than the number of other sessions.	Percentage	0	0	4.4	51.8	43.8	
	Number	0	0	5	58	49	112

Discussion

The findings of the present study revealed that question-answer teaching method significantly increases the learning rate of the materials. Positive effect of the active teaching methods in enhancing learning outcome has been frequently reported (4-6 and 16). The point to keep in mind is that, in most active teaching methods, there are obstacles that limit their application. For instance, in one of the current active methods, students are divided into small groups, and teaching process is followed along with changes in the learning process during the semester, such as increasing study hours and weekly assignments. One of the problems with this method is the limited number of students; for instance, it has been reported in one of the studies that more than 6 students in each group is considered cumbersome (4).

In another study, it is stated that "presenting the material in any way possible is not important; teacher's follow-ups are considered important" (17), which is indicative of the operational problems of various teaching methods. Also, in the application of active teaching methods, students are often given one week time to study a priori lesson plan and educational objectives and attend the following session with sufficient preparation (5). Unlike other reports on active teaching, the present study is an active teaching method with few operational barriers. This teaching method is performed in the time limit equal to lecture method with the presence of all students. Thus, this study is important in the sense that it has been implemented with minimum change in common lecture method. It has been reported that lecture method is the dominant method in health care professions with its greatest advantage of presenting a lot of information to a large number of students. Despite the emergence of more modern techniques as well as spread of knowledge, this method is still one of the major teaching methods (18).

The findings of the present study revealed that with simple changes in traditional teaching method, while keeping the advantages of this method, we can transform it to an active teaching method and apply it to enhance the learning outcome of the physiology course. In fact, the method used in this study, while being simple and cost-effective, had a significant impact on learning outcome and satisfaction of the students.

Overall, the results of this study indicated that, by concentrating on the educational sessions, it is possible to promote learning with little changes in the process of teaching and apply it in a more extensive level. On the other hand, retention of information in this method did

not show a significant increase and there was only in one case a significant difference in groups after one month. This finding is in line with the findings of other relevant research on active teaching methods which is believed to be the result of emphasis of tests on the knowledge of the learners (4). Moreover, the majority of students preferred this method to lecture method and confirmed its positive changes.

Conclusion

The findings of this study revealed that using simple, active question-answer method results in enhancement of learning. Thus, considering the benefits of this method such as its simplicity as well as positive effects on students' satisfaction and learning outcome, application of this method is recommended in basic sciences courses.

Acknowledgement

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