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## THE DIFFERENCE IN PERCEPTION OF THE STUDENTS IN ANATOMY USING PROBLEM-BASED LEARNING AND LECTURES IN THE FACULTY OF MEDICINE, UNIVERSITY OF GADARIF.

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### ABSTRACT

**Objectives:** This research aims to evaluate the success of Problem-based learning as compared to traditional Lecture-Based Learning in gross anatomy in second-year bachelor of medicine, bachelor of surgery S by comparing the examination performances and students' responses to the questionnaires.

**Methods:** The type of study is cross-sectional. A total of 163 second-year bachelor of medicine, bachelor of surgery students at Gadarif area Medical College. The study divided the anatomy course into two parts. The first part was educated by Problem-based learning, and the second part was taught using a traditional teaching method as a control. Assessment scores from together methods and evaluation done by completing the student feedback questionnaires. In the study, 46 students were males, and 117 were female students, respectively. Later on, results were analyzed by comparing and analyzing the results using peer-reviewed multiple-choice questions. Descriptive statistics analysis was used to analyse students' responses collected through a feedback questionnaire.

**Results:** 84.0 % of students strongly agreed that the Problem-based learning process encouraged student responsibility for the learning objectives compared with the traditional teaching method, 5.5 % disagreed with this study, and the remaining 10.4 % were neutral in their response. Feedback from students was taken in the form of a questionnaire. Evaluation of the students before and after the Problem-based learning process showed an average increase in the marks scored; the average score for the traditional method test was 62.4 with a standard deviation of 9.39, and the Problem-based learning method test score increased to 69.4 with a standard deviation of 11.94. Mean±SD values were higher with the Problem-based learning method of study.

**Conclusion:** The P values in the traditional method test and the Problem-based learning method test are statistically highly significant ( $p < 0.05$ ), which means the Problem-based learning is a better mode of teaching when compared to a traditional teaching method in anatomy. Therefore, the use of Problem-based learning is highly recommended as an educational method in medical schools.

**KEYWORDS:** problem-based learning, traditional lecture-based learning, medical education.

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## INTRODUCTION

The best way to assess and improve the teaching methodology is through the students' feedback. Problem-based learning was one such important teaching methodology that was first developed by [Barrows, H. 1996] Barrows writes that students attending medical school felt bored and unmotivated by their studies as a result of "the vast amounts of information they had to absorb, much of which was perceived to have little relevance to medical practice". [Barrows H, Tamblyn R. 1976]. As there is a general consensus that motivation is critical for students' learning, [Moskovsky C., et al 2013] this was of major concern for medical schools. As a result of this discontentment among students, a new medical school was established at the McMaster University Faculty of Health Sciences. This school used a new and innovative method for teaching their students, which is known and used worldwide today. The name of this method is Problem-Based Learning, Problem-based learning. [Barrows, H. 1996].

The Problem-Based Learning Special Interest Group was established in 2000 to share ideas and offer advice and guidance to others who were considering using Problem-based learning. There is a sustained belief that this method of facilitating student learning develops and promotes motivation, meaning and lifelong learning skills. [Marcangelo, C. 2006]. to Stimulate the learners; assist them in seeing the relevance of learning to their future roles as doctors; maintain a higher level of motivation toward learning; and show the students the importance of responsible, professional attitudes [Barrows, H. 1996].

Problem-based learning curricula are often integrated across the sciences basic to medicine, as well as among departments and activities such as clinical skills and doctor-patient society courses that have traditionally been restricted to particular years of the curriculum.

Evaluating the success of Problem-based learning as compared to more traditional Lecture Based Learning requires more complex techniques. The guiding principle of assessment includes content learning. An effective assessment and evaluation programme can ensure that students are deriving maximum benefits from Problem-based learning.

The anatomical sciences have traditionally been taught in three separate courses: embryology, his-

tology, and gross anatomy, and in medical schools. Here, it is done primarily by utilizing a lecture and laboratory format. Gross anatomy starts immediately at the beginning of the first semester with a unique concept. A topic is dealt with in lectures in one week, followed by dissecting this region the next week and a seminar in living anatomy dealing with the same area, whereby the students partly identify the structures on each other. The aim of this study was to compare the traditional method of teaching anatomy with the new Problem-based learning method in 163 level medicine students of the University of Gadarif and set a baseline for developing the practice of Problem-based learning in our environment.

The study of Problem-based learning is important in our study because the primary goal of Problem-based learning is to enhance learning by requiring learners to solve problems. It is a methodology with the following characteristics: It is problem-focused, such that learners begin learning by addressing simulations of an authentic, ill-structured problem; it is student-centred because faculty cannot dictate learning; it is self-reflective, such that learners monitor their understanding and learn to adjust strategies for learning.

## MATERIALS AND METHODS

This study has been designed as a comparative analytic institution-based study in Gadarif University Faculty of Medicine, Sudan. The Course Experience Questionnaire was designed to measure the quality of the learning experience, and the Student Course Experience Questionnaire was used in this study. We were trained in gross anatomy with conventional teaching for one part of the course and Problem-based learning for the second part. Assessment scores from together methods and evaluation done by completing the student feedback questionnaires. This study was performed within the Gadarif University faculty of medicine, teaching the students gross anatomy with conventional teaching for one course and Problem-based learning for another course. This study was conducted at a premier problem-based learning medical school in Sudan. The study included all students of second-year medical students at Gadarif University faculty, with Medicine, with no exclusion. The paper-based questionnaire comprised 10 descriptive questions:

agree, neutral, and disagree. Praveen et al study [Singh, P. 2011]. students' responses questionnaire has been used in this study. Data processing and analysis comparison on significant tests. All statistical analyses were done using SPSS, version 16 Statistical Package for the Social Sciences (SPSS, Chicago, Illinois). Pearson correlation was used to determine the association between continuous quantitative variables. Descriptive statistics have been used to compare Problem-based learning and conventional teaching methods, which helps develop student skills, particularly problem-solving skills, and sharpens analytic skills. This study has been approved by the Ethics Committee of Gadarif University Faculty of Medicine and students' consent.

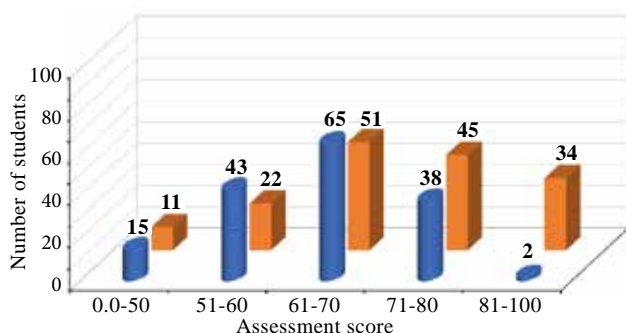
### RESULTS

163 second-year Bachelor of medicine, bachelor of surgery students at Gadarif area Medical College Were trained in gross anatomy with conventional teaching for one course and Problem-based learning for the other.

The following assessment scores from together methods and evaluation done by completing the student feedback questionnaires.

The traditional method test and the Problem-based learning method test scores were evaluated. The student's perception of Problem-based learning was also evaluated with a percentage of positive responses by each student.

Evaluation of the students before and after the problem-based learning process showed an average increase in the marks scored; the average score for the traditional method test was 62.4 with a standard deviation of 9.39, and the Problem-based learning method test score increased to 69.4 with a standard deviation of 11.94, which is shown in Fig 1.



**FIGURE 1.** Scattergraphs the score test of the students in traditional (cylinders) test and problem-based learning (PBL) test (boxes) methods.

Evaluation of the students before and after the problem-based learning process showed an average increase in the marks scored.

There was a statistically significant difference between the traditional and BPL methods ( $P < 0.05$ ). That means the Problem-based learning was effective and more beneficial than a traditional teaching method. Descriptive statistics were used to analyse students' responses, collected through a feedback questionnaire: 76.1% of students strongly agreed that Problem-based learning is a useful method of the tool of learning comparatively to traditional teaching methods, 6.7% disagreed with this study, and the remaining 17.2% were neutral in their response. 74.2% of students strongly agreed that Problem-based learning helps improve and further understand the tool learning method of comparatively traditional teaching methods, 8.6% disagreed with this study, and the remaining 17.2% were neutral in their response. 84.0% of students strongly agreed that Problem-based learning is a process that encourages student responsibility for the learning objectives method of the tool of learning comparatively traditional teaching method, 5.5% disagreed with this study, and the remaining 10.4% were neutral in their response. 79.8% of students strongly agreed that Problem-based learning is more interactive than traditional teaching, 6.1% disagreed with this study, and the remaining 14.1% were neutral in their responses. 63.2% of students strongly agreed that Problem-based learning improves problem-solving ability compared to the traditional teaching method, 7.4% disagreed with this study, and the remaining 29.4% were neutral in their responses. 39.9% of students strongly agreed that facilitators were helpful in the Problem-based learning method of the learning tool, 16.0% disagreed with this study, and the remaining 44.2% were neutral in their responses. 38.7% of students strongly agreed that presentations helped them learn better using the Problem-based learning method of learning, 33.7% disagreed with this study, and the remaining 27.6% were neutral in their responses. 82.8% of students strongly agreed that Problem-based learning gave the learners the opportunity to express themselves in learning, 3.1% disagreed with this study, and the remaining 14.1% were neutral in their responses. 72.4% of students strongly agreed

that Problem-based learning helps to perform better in university exams, 3.7 % disagreed with this study, and the remaining 23.9 % were neutral in their response. 76.7 % of students strongly agreed that Problem-based learning helps them perform better in the later days of the clinical course, 6.7 % disagreed with this study, and the remaining 16.6 % were neutral in their response. (Table 1).

### DISCUSSION:

The Problem-based learning method is one of the modern methods in education. Problem-based learning uses simulated case scenarios and so is close to experiential learning. It creates the feel of a veritable situation so that learners engage with the case if they are learning from their expertise and developing thinking proficiency, as suggested by other researchers [Magnussen L et al 2000; Hodges H 2011; Oja K.J. 2011]. Problem-based learning also helps students to have a planned experience of collaboration, communication [Utsun B et al 2006].and teamwork through small group work. Problem-based learning encourages students to engage in their learning through questioning actively, discussing and researching the problem at hand. This skillfulness prepares students to be life-long learners [Kocaman G et al 2009]. Problem-based learning also encourages reflection.

The study reveals that the Problem-based learn-

ing system helps develop student skills, particularly problem-solving skills, and helps to sharpen analytic skills. [Hinduja K et al 2005]. established in their study that students with a traditional teaching method system will have better anatomical knowledge and skills than those trained with an integrated type of course. However, [Nandi PL et al 2013]. stated that combining both conventional teaching and Problem-based learning might offer the most effective training for medical students. [Musal B et al 2004]. said that the increase in students' Problem-based learning experience helps develop their conversation skills. According to our results, the mean consequence on tests which had been taught to students traditionally and via Problem-based learning demonstrates that the Problem-based learning method was possibly more effective in helping learners learn the material and gain higher scores.

The findings of this study support evaluative literature related to problem-based learning and deep learning, as learners valued the relationship between theory and practice and showed improved comprehension and retention of content. This is consistent with the deep learning associated with problem-based learning reported previously [Nayak S et al 2006; Fyrenius A 2007; Abraham R 2008]. According to our study, the mean score on tests which had been taught to students traditionally and via problem-based learning established that the problem-based learning method was probably more effective in helping learners learn the material and gain higher scores. The review of other studies evidenced that problem-based learning resulted in a greater score in anatomy exams in four studies [Khaki A et al 2007; Cowan M 2010; Loffler S 2011; Vasan N 2011]. The differences can also be observed in the mean scores of students in the examinations after traditional teaching and problem-based learning.

This explains that the median and the mean obtained for these methods favour Problem-based learning. These findings are similar to those of other authors [Norman Get al 1992; Vernon D1993; Bulte JA1998; Ganske I 2006].

The p values gained from our questionnaires elucidated that the Problem-based learning improved students' perception of their information, which others have reported [Musal B et al 2004; Karrar A.2024]. Feedback from students com-

TABLE 1.

Perception of the Students.

| Questions   | Agreed | Neutral | Disagreed |
|---|--------|---------|-----------|
| Method used in teaching case based learning in anatomy was useful (%)     | 76.1   | 17.2    | 6.7       |
| Helped in improving understanding further (%)                             | 74.2   | 17.2    | 8.6       |
| Process encouraged student responsibility for the learning objectives (%) | 84.0   | 10.4    | 5.5       |
| Brought in more interaction (%)   | 79.8   | 14.1    | 6.1       |
| Improve problem solving ability (%)                                       | 63.2   | 29.4    | 7.4       |
| Facilitators were helpful (%)   | 39.9   | 44.2    | 16.0      |
| Presentations helped to learn better (%)                                  | 38.7   | 27.6    | 33.7      |
| Opportunity to express (%)  | 82.8   | 14.1    | 3.1       |
| Will help to perform better in University exam (%)                        | 72.4   | 23.9    | 3.7       |
| Will help to perform better in later days of clinical course (%)          | 76.7   | 16.6    | 6.7       |

mented that Problem-based learning enhanced their understanding of anatomy and motivated them to read more. Problem-based learning enabled them to remember the object better and helped them to integrate their information. All these consequences are due to the active involvement of students and motivation in the teaching-learning process in problem-based learning. Most students expressed a wish and a need to continue problem-based learning sessions in the future. On the contrary, they didn't want to replace all the lectures with problem-based learning but proposed a hybrid method. The problem that appeared during the study, as per students' perception, was that problem-based learning is time-consuming.

Limitations of the Study: Only small groups can be taught. Requires trained facilitators. Time is a major constant. Student's attention has to be maintained for a long time. Only clinically relevant topics can be taught through Problem-based learning (prior basic knowledge is necessary for the student).

#### CONCLUSIONS

The Problem-based learning is a better mode of teaching than the traditional teaching method

in anatomy for certain clinically relevant topics, which enhances self-directed learning and problem-solving. The Problem-based learning method resulted in improved assessment scores compared to traditional teaching for the same students, and they believed that this method augmented their problem-solving abilities.

#### RECOMMENDATION

Based on the above results, we recommended the following:-

To determine the suitability of Problem-based learning over classical in subjects other than medicals.

However, Problem-based learning is only as good as the cases, supporting resources, and group facilitators allow, so a lot of work has to be put into the design of the cases and ILOs (individual learning objectives), comprehensive provision of supporting materials (papers, chapters, lectures, podcasts, web links, etc.), and training of staff in Problem-based learning techniques in order for it to be a success. In medicine, it's also important to tie the cases to the student's clinical learning and experience so that the two go hand-in-hand.

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