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Original Research Article

OSCE Performance in Radiology of MBBS I and II Students, at the Faculty of Medicine, University of Botswana

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ABSTRACT

Over the centuries, basic medical sciences and clinical disciplines, at medical schools, have been taught by a traditional method. The recently developed PBL method was introduced as an alternative to the traditional curriculum. The PBL method quickly gained popularity over the traditional curriculum. Despite some advantages of the PBL curriculum, the traditional teaching method was still widely used. In medical schools, the undergraduate training in radiology was not standardized. A few papers reported on the OSCE performance in radiology. The aim of the present research was to study the OSCE results in radiology of medical students. Attempts were also made to identify the deficiencies in radiological education and suggest ways for their solution. The results indicated low OSCE pass rate. For the first year students, at the stations, they ranged between7-89 percent and the overall score was 19-28 percent. For the second year students, the results at the stations were 0-93percent and the overall performance was 32-50 percent. In conclusion, the students showed significant deficiencies in the knowledge of radiology. The little knowledge was fragmented and they found it difficult to make a meaningful statement or conclusion. The teaching of radiology by a traditional method, based on a PBL curriculum, should be well planned. The OSCE performance will improve if the number of teaching hours was increased and the gaps between the sessions were narrowed. The radiological anatomy should be taught by trained anatomists or radiologists. The practical sessions in radiological anatomy, should be carried out in a specially-resourced gross anatomy laboratory.

Key words: OSCE, performance, radiology, teaching.

INTRODUCTION

Over the centuries, basic medical sciences and clinical disciplines, at medical schools, have been taught by a traditional method, which is based on didactic lectures, practical classes and small groups tutorials. For hundreds of years, this method established itself as a preferred choice of teaching. This is because the subjects were taught in a sequential and logical manner and the students acquired a good level of medical knowledge. [1,2] During the past several decades, however, a number of research papers, on medical education, described the traditional teaching method as passive, non-relevant and boring, which requires memorization of facts. [2,3] Despite the negative writings on the educational values of the traditional teaching method, it is still used or even re-introduced in a number of medical schools in North America, Europe and Australia. Recent studies reported that, in Europe, in 20 out of

34 countries, the traditional curriculum is a preferred method in medical education. [4]

The more recently developed, in Canada (1969), problem-based learning (PBL) method was adopted in a number of medical schools as an alternative to the traditional curriculum. The new teaching method quickly gained popularity, in medical education, because of some advantages over the traditional curriculum. It was reported, that one of the major priority of the PBL method was the possibility for an early integration of basic medical and clinical subjects. Some of the authors found that the PBL curriculum allows the students to better understand the role of radiology in diagnosis and patient management. [5-7] other research papers recommended the PBL method as an effective tool in the study of the radiological signs and principals, provided that the images are incorporated in the clinical cases. The authors of more recent papers, however, are of the opinion that it is neither possible nor desirable, to teach all aspects of the medical curriculum through the PBL method. [8] These authors believe that certain practical skills, included in radiology, cannot be acquired by the PBL method and suggested the introduction of a hybrid curriculum. The latter method allows the use of lectures and practical classes, alongside the PBL clinical tutorials. [6,9]

In addition to the confusion on the use of medical curricula, there are papers reporting that, in the medical schools of the USA, Europe and Australia, the undergraduate training in radiology is not standardized. [10] This conclusion is supported by the fact that the students, at various medical schools, are exposed to the subject at different stage of their education, which varies from the first to the sixth year. Some medical schools even offer the subject to be taken as an elective course. Most of the educators in radiology and Imaging, however, believe that, in the undergraduate years of education, the subject should be taught continuously from the first year to the last. [4] Another example for the lack of standardization, in radiology training, is the inconsistency in the number of teaching hours, which vary from one medical school to another, between 19h-212h. There are reports stating that, in a large number of medical schools, the acquired radiological knowledge is assessed by an Objective Structured Clinical Examination (OSCE). [11]

The authors believe that this method of assessment is an excellent teaching tool, which allows for the actual demonstration of applied knowledge and skill, rather than testing the knowledge alone. [12] It is also believed that OSCE assesses objectively the clinical competence of the learner, in an environment similar to clinical practice. [13] In addition, the researchers found that the OSCE assessment is more reliable than the written paper examination, provided that, during the examination, more stations are set. [14] At our faculty, the OSCE assessment of the knowledge, in radiology, is part of the general OSCE assessment, carried out at the end of each academic year. In the literature review, we failed to find detailed reports on the OSCE performance, in radiology, of the first and second year medical students.

The aim of the present investigation was an attempt to study and analyze the OSCE results obtained at the various examination stations as well as the overall performance of the first and second year medical students. In addition, we intended to identify any deficiencies in the radiological education and suggest practical ways for their solution.

MATERIALS AND METHODS

We used non-experimental data collection and analysis method. The data were gathered through "documentary analysis", which included a survey of the OSCE results, in radiology, of class I and class II students. The class I, consisting of 54 first year students, was assessed at the end of 2013 academic year and at the end of 2014, when they were already in their second year. The class II, consisting of 53 students was assessed at the end of their first

year, in 2014 and at the end of their second year, in 2015. The OSCE radiology results of the two classes of students were recorded, tabulated and analyzed.

The PBL curriculum, at the faculty, was divided into a pre-clinical part or phases I and a clinical part or phase II. The phase I comprised the first two years of the medical education. During this phase the students covered 15 PBL teaching blocks (7 in the first year and 8 in the second year). Despite the use of a PBL curriculum, at the faculty, the subject of radiology was taught by a traditional method of teaching. The latter method, however, was based on the PBL curriculum, since the radiology teaching followed the topics of the PBL blocks. These days, the combination between the two teaching methods was referred to as a hybrid method of teaching.

The traditional method, used by us, was confined to one radiology workshop per PBL block. During the first year, were carried out 3 workshops, each one of 2 h duration (1h lecture presentation followed by 1h practical work). In addition, for the first year students, only, there was a 1h introductory presentation, on the ultrasound scanning images, which made the total teaching time of 7 hours (4h lectures and 3h practical sessions). It should be pointed out that radiological workshops were not provided for the PBL blocks, in which anatomical systems were not included, such as the blocks for the infectious diseases, Immune system and so on.

For the second year students, were allocated a total of 9 workshops (7 on radiology and 2 on ultrasound). The duration of the second yearradiology course was 18 h (10h lectures and 8h practical sessions). During the second year, the students studied radiological anatomy, to which clinical patterns were incorporated.

The radiology knowledge of the first and second year students was assessed by MCQ tests and Objective Structured Clinical Examination (OSCE) method. The MCQ test was carried out at the end of each PBL block and contained 5 radiology questions, incorporated in the paper. The radiology OSCE, for the first and second year students, was part of the general OSCE, which was carried out at the end of each academic year. The radiology component of the OSCE consisted of 3 stations, for both the first and second year students.

For the first year students, station I consisted of 2 Chest X-Ray (CXR) films. On this station were asked 5 questions for 5 marks and the students were given 5 min. per station. Station II was on the Gastro-Intestinal Tract (GIT) and station III, on the Musculo-Skeletal system (MSS-spine), respectively. Each one of these stations consisted of 3-5 X-Ray films and the exam conditions were the same as those for station I. For the second year students, station I was on the Chest X-Ray (CXR), station II- on the Genito-Urinary Tract (GUT) and station III - on the Musculo-Skeletal system (MSS-extremities and skull), respectively. The examination conditions were the same to those for the first year students. The overall OSCE performance of the students (i. e. the number of students that passed all three stations) was also calculated.

RESULTS

The results indicated that the first year students of class I (year 2013) showed a low pass rate, at all OSCE stations, included the overall performance. The only exception was at station III (MSS-spine, Table 1).

The first year students of class II (year 2014) again showed a very low pass rate at all OSCE stations, included the overall performance. The only exception was station II (GIT, Table 2).

The second year students of class I (year 2014) show a little improvement of OSCE pass rate included the overall performance. The only exception is at station II (GUT, Table 3).

The second year students of class II (year 2015) show a very low OSCE pass rate at all stations included the overall

performance. The only exception is at station II (GUT, Table 4).

Table 1: OSCE results in radiological anatomy shown by the first year students of class I, at the end of the 2013 academic year.

N of students 54 (100%)	Chest (Thorax)	Digestive system (GIT)	Musculo-skeletal System (Mss-Spine)	Overall
Passed	4 (7%)	5 (9%)	45 (83%)	10 (19%)
Failed	50 (93%)	49 (91%)	9 (17%)	44 (81%)

Table 2: OSCE results in radiological anatomy shown by the first year students of the class II, at the end of 2014 academic year.

N of students 53 (100%)	Chest (Thorax)	Digestive system (GIT)	Musculo-skeletal System (Mss-Spine)	Overall
Passed	11 (21%)	47 (89%)	10 (19%)	15 (28%)
Failed	42 (79%)	6 (11%)	43 (81%)	38 (72%)

Table 3: OSCE results in radiological anatomy and basic clinical radiology shown by the second year students of class I, at the end of the 2014 academic year.

N of students (54)	Chest (Thorax)	Genito-Urinary System (GUT)	Musculo-Skeletal System (Limbs, Skull)	Overall
Passed	41 (76%)	4 (7%)	41 (76%)	27 (50%)
Failed	13 (24%)	50 (93%)	13 (24%)	27 (50%)

Table 4: OSCE results in radiological anatomy and basic clinical radiology shown by the second year students of class ii, at the end of the 2015 academic year.

N of students 53	Chest (Thorax)	Genito-Urinary System	Musculo-Skeletal System (Limbs, Skull)	Overall
Passed	0 (0%)	10 (19%)	26 (49%)	17 (32%)
Failed	53 (100%)	43 (81%)	27 (51%)	36 (68%)

DISCUSSION

It is known that there are three teaching methods, used in medical education, namely, traditional, PBL and hybrid. It should be pointed out that the latter method is a combination between the first and the second one. In our case, the subject of radiology was taught by a traditional teaching method, which, however, was based on the topics of the PBL curriculum, adopted by the faculty. This is the reason to accept that, in fact, we used a hybrid teaching method, because our teaching was heavily dependent on the topics of the PBL curriculum. We have chosen to use the term traditional method of teaching, because the radiological topics were taught by lectures and practical sessions. Besides, the traditional teaching of radiology is the preferred method, in the medical schools of Europe, the USA and the rest of the world. [4]

It is well known, amongst the international radiological community, that the undergraduate training in radiology is not standardized in the medical schools, throughout the world this conclusion is supported by the fact that medical students are exposed to the subject at different stage of their education. The teaching of radiology, may vary from the first to the sixth year, may be taught for the full period of their education or may even be offered as an elective course. [15-17] Another example for the lack of standardization, in radiology training, is the inconsistency in the number of teaching hours, provided by the curricula. The duration of the course varies from one medical school to another and is 19h-212h. [10]

Analysis of our results indicated that, our PBL curriculum allows 12 workshops or 24h, for radiology teaching. Out of the 24h, the first year students receives 7h (4h lectures and 3h practical sessions), which they use to study radiological anatomy. For the second year students, were allocated a total of 9 workshops (7 on radiology and 2 on ultrasound). Therefore, the duration of the radiology course was 18 h (10h lectures and 8h practical sessions), during which they studied radiological anatomy, to which clinical patterns were incorporated.

The knowledge of our first and second year students was assessed by Objective Structured Clinical Examination (OSCE). We agree with the earlier researchers that the OSCE is a reliable evaluation method, because it assesses objectively the clinical competence of the learner, in an environment similar to clinical practice. [13] We also support the statement of previous authors that this method is more reliable than the written paper examination,

provided more radiology examination stations are set. [14]

Analysis of the OSCE results, in radiological anatomy, of the first year medical student from class I and II (year 2013 and 2014), respectively, indicated a very low pass rate (7%-21%), at the two of the three stations, and 19%-28% for the overall performance. An exception from this unsatisfactory performance was the excellent pass rate of 83% at the MSS station, for class 2013 and 89%, at the GIT station, for class 2014. A comparison of the weak OSCE performance, of the two classes of our first year students, to the OSCE results of the first year students described in a previous study indicated a little difference between them. [6]

We assume that the low pass rate of our first year students is due to the insufficient and irregularly distributed teaching time, provided by the PBL curriculum, used in our faculty. It is difficult to accept that the radiological anatomy, of a number of human body systems, will be adequately covered in 3 workshops (7h). Another reason evolves from the nature of the PBL teaching. Because of that, the radiology workshops are sometimes presented with a huge gaps between them, which does not allow a good retention of the previously acquired knowledge by the students. These facts allow us to assume that the poor OSCE performance of our students is a result of: 1) The low level of gross anatomy knowledge and 2) The insufficient and in sequentially distributed teaching time, provided by the PBL curriculum. We, however, found it difficult, for now, to explain the impressive pass rate of 89%, at the GIT station, of the first year students of class 2014 and the disastrous performance (9%) of the first year students from class (2015), at the same GIT station.

Analysis of the OSCE results of the second year students (class 2014), indicated a significant improvement in the pass rate, in comparison to that recorded in their first year. The students scored 76% at the CXR station, 76% at the MSS station and 50% for the overall performance. The only exception was at the GUS station, where the pass rate was 7%, only. The improved OSCE performance, in clinical radiology, of the second year students of class 2014, could be explained with the substantial increase of the teaching time for these systems.

Contrary to the satisfactory results obtained by the second year students of class 2014, the OSCE performance of their colleagues of class 2015, showed again a poor pass rate of 0%, 19%, 49% and 32%, at all three stations and the overall performance, respectively. The poor performance of class 2015 could be related to the low level of gross anatomy knowledge, by most of these students. It appears that only few of them managed to grasp the basic radiological anatomy and radiological patterns of the assessed systems. A typical example for these statements is the 0% pass rate, scored at the CXR station, despite the increased teaching hours for this topic.

It is generally accepted that a good understanding of the CXR is particularly important for every physician. [3] From our results follows that students experience serious difficulties in recognizing the images of basic anatomical structures, in the chest. We believe that these difficulties arise from the poor knowledge of the anatomy of the organs in the thoracic and abdominal cavities and particularly the spatial relations between them. The low performance of our students at the systemic stations and at the overall radiological performance makes us think of a re-evaluation in the teaching of anatomy and radiology, which suggestion coincides with a similar suggestion of previous authors. [6]

CONCLUSION

In was concluded, that the students showed serious deficiencies in the knowledge of radiology. In addition, the little available knowledge is fragmented and the students are unable to make a meaningful statement or conclusion. It is not in the interest of radiology to be heavily

dependent on the PBL curriculum. The radiologists need more freedom to choose the frequency and duration of the radiology teaching. The OSCE performance will improve if the number of teaching hours, per PBL block, is increased significantly and the gaps between the wide gaps between the workshops are narrowed. Secondly, the subject of radiology should be taught by specially trained anatomists or professional radiologists. Thirdly, the practical sessions in radiological anatomy, should be carried out in a specially-resourced, for the purpose, gross anatomy laboratory.

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