ORIGINAL ARTICLE

Medical Students' Performance in Anatomy: Integrated versus Subject-Based Scores

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ABSTRACT

Objective: The objective of the study was to compare the anatomy scores with total scores in exams with integrated results and exams with subject-based results and to compare the anatomy scores in exams with integrated results with exams with subject-based results.

Study Design: Quantitative/observational, retrospective study with universal sampling.

Place and Duration of Study: The study was conducted in the Department of Anatomy of Foundation University School of Health Sciences Islamabad, Pakistan, from 1st May 2022 to 31st August 2022.

Materials and Methods: The study was conducted on scores of the First professional examination in two groups of MBBS students; Group A (n=150). The result was based on integrated scores, and Group B (n=149): Result was based on subject score. The mean Anatomy score (AS) percentage in Groups A & B was compared with the mean total score (TS) percentage in both groups, respectively, and with each other using Student's t test.

Results: The Anatomy score in Group A (63.72%±12.20) and Group B (66.26%±12.7) was less than the Total score (Group A:69.38%±8.79, Group B:67.56±10.93). This difference was statistically significant (p=0.00) in Group A. The Anatomy score in Group A was less than in Group B, but the difference was not statistically significant (p=0.08).

Conclusion: The Anatomy score was significantly less than the Total score in exams with integrated results. Moreover, the Anatomy score was less in the exams with integrated results as compared to exams with subject-based Results.

Keywords: *Academic Performance, Anatomy, Curriculum, Medical Students.*

How to cite this: *Islam S, Khan HM, Rashid N, Akhtar L, Rashid S, Anwar N. Medical Students' Performance in Anatomy: Integrated versus Subject Based Scores. Life and Science. 2023; 4(3): 334-338. doi: http://doi.org/10.37185/LnS.1.1.329*

Introduction

The medical curriculum has undergone revolutionary changes in the last decade. Although the debate about traditional and integrated medical curricula is still ongoing, more and more institutions are replacing Flexner's curriculum with an Integrated curriculum. In the Integrated curriculum, basic science and clinical subjects are integrated to make knowledge more relevant and meaningful to the medical student.[1] Most educationists are convinced that for integrated teaching to be successful, it is imperative to adopt Integrated assessment,[2] otherwise, it is feared that in spite of all energies directed towards the integration of curriculum, it may fail to achieve the desired outcome,[3] However, some educationists are apprehensive and consider it one of the major drawbacks of Integrated curriculum that the students can pass courses without achieving the minimum requirements in each subject. It has been observed that students neglect some subjects according to their weightage in the course and still manage to obtain passing grades in the integrated scores.[4]

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Funding Source: NIL; Conflict of Interest: NIL
Received: Apr 10, 2022; Revised: Dec 01, 2022
Accepted: Feb 12, 2023

Anatomy is one of the major pillars of medical sciences and has been considered as an integral part of the medical curriculum since historic times. The knowledge of Anatomy forms the basis of all pathologies and is considered essential for safe medical practice. Yet learning anatomy requires a strong imagination and a powerful memory to absorb the extensive terminology and its vast content.[5] It is thus considered a hard subject, and learning human anatomy is challenging for medical students.[6,7] Therefore, it has been observed that many students tend to focus and rely on other subjects for achieving an integrated passing score. As a result, medical educationists are apprehensive that if this continues, it might seriously affect the knowledge of anatomy in the graduating students and compromise their clinical practice. This concern has been further strengthened by multiple studies which show that graduating doctors generally have insufficient knowledge of anatomy for safe medical practice.[8,9,10] Newer integrated curricula with integrated assessment may be one of the reasons for this decline in anatomy knowledge in medical doctors; however enough and conclusive evidence in this regard is not available.[11,12]

With this background in mind, the present study was planned to:

1. Compare the anatomy scores with Total scores in exams with Integrated results and exams with Subject-based results.
2. Compare the anatomy scores in exams with Integrated results with anatomy scores in exams with Subject-based results.

This study will help to give an insight into developing assessment policies which will lead to the achievement of the desired outcome in graduating students.

Materials and Methods

This quantitative, observational, retrospective study was conducted in the Department of Anatomy, Foundation University School of Health Sciences Islamabad, Pakistan from 1st February 31st August 2022. In Foundation University Medical College, First and Second-year MBBS students are taught through Integrated system-based modules, followed by integrated exams. At the end of the year, the students are assessed by integrated Professional exams that include equal contributions from the three Basic science subjects (Anatomy, Physiology, and Biochemistry) along with vertically integrated subjects incorporated within the relevant Basic science subject.

The present study was conducted on the scores of the First professional exam results of two groups of First Year MBBS students.

1. Group A comprised scores of the First year MBBS batch 2020-2024 who appeared in their First Professional exam in Dec 2020. In this group, as per the exam policy applicable, the result was based on integrated exam scores which is the Total score achieved by the candidate in all three subjects in various components of the exam (Exams with Integrated Results).
2. Group B comprised results of First-year MBBS batch 2021-2025 who appeared in their First Professional exam in Dec 2021. In this group, as per the exam policy applicable at that time, the result was based on subject score, which is the sum of scores achieved in a particular subject in various exam components. (Exams with subject based Results).

The marks allocated to all three Basic science subjects were equal and the same in the exams of both groups. After approval by the Ethical review committee vide letter no FF/FUMC/215-222 Phy/22, the required data was acquired from the Exam Department of Foundation University. The T Sampling technique was used, and the scores of all the students in the two batches were included, except those who had not participated in all components of the exams. Anatomy scores (AS), which are the scores achieved in Anatomy; and Total scores (TS), the sum of the score in all three subjects of both batches, were entered in SPSS version 21 for analysis. Mean±SD of the scores was calculated. The scores were converted into percentages. Mean±SD of these percentages was calculated in Groups A & B. The mean percentage of anatomy score (AS) in Groups A & B was compared with the mean percentage of Total score (TS) in both A & B groups, respectively using Student's t test. The mean of anatomy score (AS) was also compared between the two groups (i.e., A and B) using Student's t test. The number of students scoring less than 50% marks in

anatomy (AS) in Groups A and B was compared with the number and percentage of students scoring less than 50% marks in total score (TS) in their respective groups using the McNemar Chi-square test.

The frequency and percentages of students scoring less than 50% Anatomy scores (AS) in Groups A and B were compared using Chi-square Test. A *p*-value less than 0.05 was taken as significant.

Results

One hundred and fifty students appeared in the First professional MBBS examination 2020 (Group A) and 2021 (Group B). However, the score of one student of Group A was excluded from the study. Hence, we had scores of 149 students in Group A and 150 students in Group B.

The results showed that in Group A, the mean anatomy score was 127.45/200 ± 24.40 and the mean total score was 415.63/600 ± 52.81. The mean percentage of anatomy score was less than the mean percentage of the Total score with a statistically significant difference.

In Group B, the mean anatomy score was 132.52/200 ± 25.43 and the mean Total score was 404.96/600 ± 65.56. The mean percentage of anatomy was less than the mean percentage of the Total score, but the difference was not statistically significant. (Table 1).

The mean Anatomy score (AS) for both groups was also compared. The mean AS and mean percentage score were higher in Group B to that in Group A. However, this mean difference was not statistically significant (*p*=0.08).

In Group A, 19/149 (6.3%) students scored less than 50% marks in Anatomy, whereas 3/149 (1 %) students had less 50% marks in Total scores. This difference was statistically significant (*p* value=0.000).

In Group B, the number of students scoring less than 50 % marks in Anatomy [11/150 (3.7 %)] were more than the students achieving less than 50% in the total score [9/150 (3 %)], but this difference was not statistically significant (*p* value = 0.815)

The results showed that in Group A, 18 students acquired more than 50% marks in Total score without achieving more than 50% marks in Anatomy. Whereas in Group B the number of students who scored more than 50% marks in Total score without scoring more than 50% marks in Anatomy was reduced to 10.

The number of students obtaining less than 50% marks in Anatomy was more in Group A (19/150) than Group B (11/150), though this difference was not statistically significant (*p* value =0.633).

Table 1: Mean percentages of anatomy and total scores

Variables	Group A (n=149)	Group B (n=150)
Mean percentage of Anatomy score ± SD	63.72% ± 12.20	66.26% ± 12.7
Mean percentage of Total score ± SD	69.38% ± 8.79	67.56±10.93
Statistical Significance *p* value	0.000	0.214

Discussion

Curriculum is derived from a Latin word, which means “course of study”.[13] In medical education integrated curriculum is replacing the traditional one throughout the world including Pakistan. It is hoped that this will lead to better retention and application of knowledge across the basic and clinical sciences.[14] The integrated curriculum encompasses not only integrated teaching but also integrated assessment which is thought to provide a platform which will link knowledge of graduating doctors to real life practical application.[2] In spite of all efforts aimed at improving student outcome, there is a growing concern that knowledge of anatomy among medical students and clinicians is gradually deteriorating.[15]

In the present study it was observed that student's scores and percentages in anatomy were statistically significantly less when compared with their total scores in 1st professional exam with integrated results. Moreover, the results of the study revealed the number of students scoring less than 50% marks in integrated score was 3/149 whereas in the same exam the students scoring less than 50% in the subject component of anatomy were significantly high 19/149. This confirms the concerns expressed by the faculty, that the students tend to achieve the minimum integrated passing score without

achieving the minimum required knowledge in each discipline.[4]

The mean score of anatomy in group B was higher than that in Group A. This can be due to the fact that in Group B, the students knew that in order to qualify in professional exam they had to acquire 50% or more marks in individual subjects, therefore, they focused on each issue separately. This reinforces the belief that "Assessment drives learning" and directs the students' learning strategies and study plans/to concentrate on various components.[16]

The findings of this study are suggestive of the fact that knowledge of anatomy is compromised in assessments in which the result is integrated. This can be explained in the light of multiple studies which indicate that students find anatomy a difficult subject because of its vast course content, difficult terminology, and lack of appropriate visualization of structures.[12] Therefore, the students tend to pass the exam based on other basic science subjects like physiology and biochemistry without putting the required effort in to the anatomy discipline.[4] Due to the reasons mentioned above along with issues in curriculum such as assessments with integrated results, the subject of anatomy is not receiving its due attention by the students.[12] This fact is evident in the study in which it was observed that medical student anatomy knowledge is insufficient for today's clinical setup.[17] A study showed that even non-professionals strongly believe that gross anatomy is important for medical education, holding the view that the medical profession's value (rating) would be diminished if Anatomy is not a significant part of the assessment.[18] Multiple other studies done in various institutes confirm this a decline in knowledge of anatomy in young doctors, which is leading to dire consequences.[10]

The implementation of meticulous assessment methods is required to improve the quality of teaching. In a study done at a medical university in the Netherlands, the students highlighted the need for assessment-driven learning to enhance their study effort to learn anatomy; this finding was found consistent with our study, which showed that when the students were informed before examinations that success in the examination will be based on performance in individual subject areas, they focused separately on each subject.[17]

Medical educationists believe that to overcome the new challenges of anatomy education, a comprehensive approach is the need of today. Apart from incorporating modern technologies in teaching Anatomy, it is essential to review teaching & assessment policies in the curriculum.[19]

Limitation of the study

In this study the comparison was done between two different cohorts of students, which may act as a confounding factor and produce bias.

Conclusion

We conclude that students' performance in anatomy was less than their overall performance in exams with integrated results. Moreover, it was also observed that the performance in anatomy was better in exams with subject-based results than exams with integrated results.

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