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Gender-based performance in anatomy modules among students of the School of Medicine and Pharmacy, the University of Rwanda

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ABSTRACT

INTRODUCTION: Narrowing the gender gap and making education more inclusive are the primary objectives of the government of Rwanda and its stakeholders. However, women are underrepresented in science, technology, engineering. Fortunately, female medical students have increased steadily in recent years. The objective was to investigate the difference between female and male performance in Anatomy

METHODS: The marks of five academic years 2017-2018 to 2021-2022 were used. IBM SPSS Statistics 23 was used to analyze the data. Male and female performance was analyzed based on the general mean scores, then the mean scores of each module, and finally the grade ranges [<50%], [50-59%], [60-69%], [70-84%], [>85%] in five years. The standard deviation and P-values were calculated for difference analysis.

RESULTS: 2433 records, 1534 (63.1%) males and 899 (36.9%) females, were pulled out, of which 35 students retook the modules; 19 females and 16 males. 41% of females and 39.6% of males scored between 60-69%, followed by 28.7% of females and 33.5% of males scored between 70-84%, 22.5% of females and 20.4% of males scored between 50-59%, and then 6.7% of females and 6.0% of male failed by scoring <50%, while 0.4% of both female and male scored >85%.

CONCLUSION: There is no significant difference between male and female students' performances in Anatomy when compared (p>0.05). However, efforts should be made to determine the reasons for the gender gap in sciences and also to find means to attract more female students into science-based courses and professions.

Keywords: Gender, Performance, Anatomy, Education, Students, Modules

INTRODUCTION

The gender norms have been well documented, and educators are exploring ways to interrupt the negative effects the rigid gender norms have on daily performance [1]. In many (if not most) societies throughout the world, a condition of gender inequality exists where women and "the feminine" are often devalued, and men and masculine traits are favored [1]. The cultural norms and poverty inhibit girls' participation in education at primary and secondary levels in Sub-Saharan Africa [2]. Girls' participation in sciences, technology, engineering, and medical subjects is

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even more affected by these norms [2]. For instance, previous studies have revealed a link between the role of family influences and expectations and students' decisions to pursue Science, Technology, Engineering, and Medicine majors in general and computer science specifically [3]. Fortunately, the number of female medical students increased steadily [3]. There is the question of how gender is involved in science and technology [4].

Anatomy is one of the basic courses that serve as the foundation for the medical profession, especially for clinicians in surgery and imaging. The knowledge of anatomy is essential to other basic and clinical courses and could be a determinant of interest in the medical profession. Hence, researchers are interested in studying the effect of gender on the academic performance of medical students. Some studies have indicated gender differences in the performance of undergraduate students [5]. The aim of this study was to investigate the difference in grades scored in different Anatomy modules by female students, compared with the scores of fellow male students. This is to observe whether academic performance in anatomy modules at the early stages of training could be a deterring factor for the gender gap in the medical profession or sciences in general.

METHODS

Study design and settings: This retrospective study comprised five academic year cohort marks, including the continuous assessment and final examination marks from 2017-2018 to 2021-2022. However, only the final examination scores were used for the comparisons between the genders.

This study was conducted in the School of Medicine and Pharmacy, College of Medicine and Health Sciences at the University of Rwanda. The Anatomy modules are taught to Medical, Dental Surgery, and Pharmacy students in the first two levels (preclinical one and preclinical two). The Anatomy modules are Histology, Embryology, Gross Anatomy One (Lower limbs, Upper limbs, and back), Gross Anatomy Two (Thorax, Abdomen, Pelvis, and Perineum), and Gross Anatomy three (Head and Neck). The study sought to specifically determine the following: (i) the difference between the general mean score of male and female students, (ii) The difference between the mean scores of male and female students in each Anatomy module, and (iii) whether males are higher performers than females in anatomy modules based on grade ranges

Data analysis: Data from the study were analyzed using IBM SPSS version 23. The researcher put all marks together and then cleaned the data by removing non-complete marks of all students who left the school or absconded before sitting for all the tests. The number of females and males was calculated, then the mean scores of females and males in all five academic years were calculated, respectively, then the mean scores of males and females in each of the Anatomy modules during all five academic years were calculated. After that, the rate number of females and males was calculated in terms of percentages based on the score range of [<50%], [50-59%], [60-69%], [70-84%], [>85%] in all five years to determine high performers.

Independent t-test was used to examine differences so that individual shifts in score, if any, between the two testing modalities contributed to the comparisons [6] at $p < 0.05$. Also, chi-square analysis was used to test for the association between gender and high performance at $p < 0.05$

RESULTS

The total number of students was two thousand four hundred thirty-three (2433); 1534 (63.1%) were male, while 899 (36.9%) were female.

During the period of all five intakes, 2398 passed at the first sit while 35 retook the exams. Out of the re-takers, 19 (54.2%) were female, whereas 16 (45.8%) were male. In all five academic years, the Female mean score was 63.95% with a standard deviation (sd) of 9.08, while the male mean was 64.48% (sd) 10.45 with a p-value of 0.02 (Figure 1). In the embryology module, the female mean score was 55.45% sd 7.72, whereas the male mean score was 55.87% sd 7.11 with a P-value of 0.67. In the module of Anatomy One, the female mean score was 64.76% sd 8, whereas the male mean score was 68.94% sd 12.24 with a P-value of 0.36. In the module of Anatomy 2, the Female mean score was 61.04 % sd 9.66 while the male score mean was 62.59% sd 9.78 with a P-value of 0.069. In the Anatomy three module, the Female mean score was 66.73% sd 7.71, while the male mean score was 67.66% sd 8.32 with a P-value of 0.10. In the Histology module, the female mean score was 69.23% sd 12.13, whereas the male mean score was 73.57% sd 8.65 with a P-value of 0.45 (Figure 2).

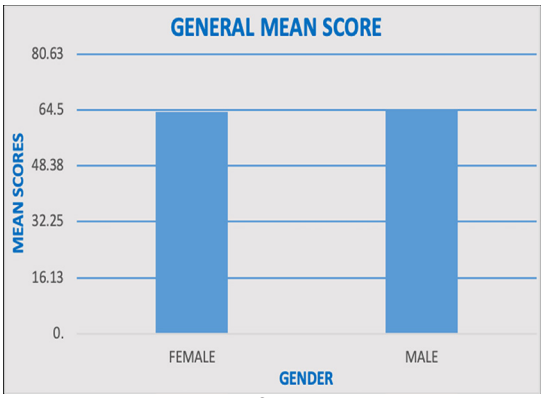

Figure 1: General performance in 5 academic years

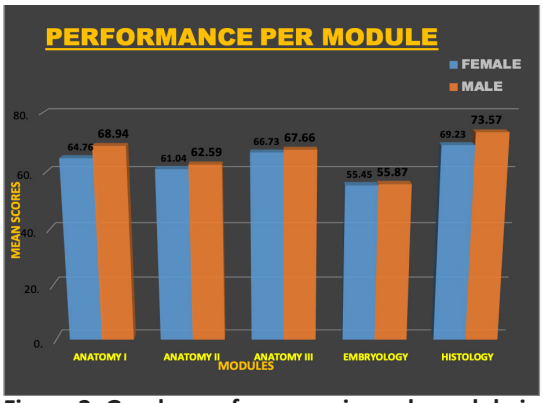

Figure 2: Gender performance in each module in five academic years

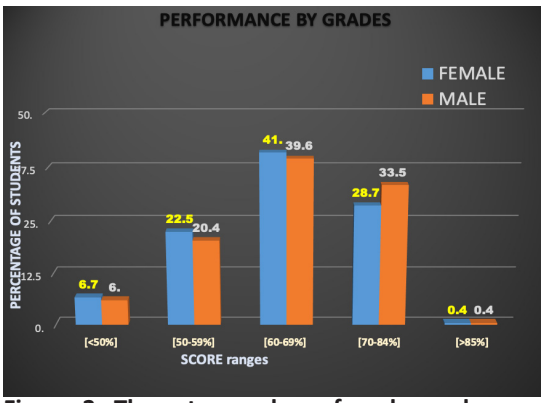

Figure 3: The rate number of each gender per score range

The majority of both males and females scored in the range of [60-69%] with the rate of 39.6% and 41%, respectively, followed by 28.7% of females vs 33.5% of males scored in the range of [70-84%], then 22.5% of female vs 20.4%of male scored in the range of [50-59%], and then 6.7% of female vs 6.0% of male failed by scoring [<50%], the minority 0.4% of both female and male scored [>85%], the P-value for all ranges was 0.197 (Figure 3).

DISCUSSION

One of the factors that has been noted to influence gender based inclusion in several professional setting is academic performance. Some women have blamed low grade scores in terms of career choice. However, some other factors have also been noted to contribute to gender disparity when it comes to underrepresentation of women in academic settings. In an effort to provide more insight to the current situation of gender imbalance in some medical teaching fields in Rwanda, most especially having lecturers in the fields of Anatomy and Physiology, this study evolved.

Anatomy is a multi-faceted course or subject which require diverse background for delivery from all the domains of knowledge. The need to have female lecturers cannot be overemphasized and the relationship between female lecturer or educators and female students should be deliberate. The relationship between female lecturers and female students can significantly impact the educational experience, professional development, and empowerment of women in academia, fostering an environment that promotes diversity, inclusion, and success for all students.

Female students have been reported to perform better as compared to their male counterparts in paraclinical & clinical subjects [5]. However, Hsin-Huiin in 2015 revealed that male students outperformed female students in science. Similarly, to what was found in the current study, even though there was no significant difference. In the study conducted by Vasan et al [6], it was found that male students scored higher compared to male students in Anatomy, but no significant difference was found, which is completely similar to the results of the current study.
Despite what was reported by Haysom et al. about Rwanda in 2021 [7] that the number of girls and boys enrolled in primary education stands almost equal, which indicates that parents now equally value the education for both girls and boys, the current study has shown that female is underrepresented 36.9% in the School of Medicine and Pharmacy, the same as what was stated by Manzar in 2004 [8] that women are underrepresented in science and technology.

Results from this study showed that there was no significant difference in the performance of males and females in the anatomy modules over the period of study i.e. 2017 - 2022. It was observed that both the overall grading and individual module grades were not significant between the genders. Hence, other factors other than academic performance could be a factor for the underrepresentation of females in anatomy teaching. It is important to suggest other factors that are yet to be observed here in Rwanda to determine why females are not at par with their male counterparts when it comes to anatomy teaching. This will complement the current efforts of the country in recognizing the importance of empowering women and girls in STEM (Science, Technology, Engineering, and Mathematics)

First and foremost, the level of awareness of students on the efforts of the government to bridge the gender-gap in institutions especially in STEM areas needs to be evaluated. Knowledge of this will assist the government and other stakeholders intensify their efforts on the strategies needed to encourage more women in STEM fields and this will also improve the gender disparity in anatomy teaching.

Another area to explore is the awareness of students on the achievements of notable female Rwandans in the aspect of medical research. Increasing the visibility of female role models in sciences could inspire more females to take up responsibilities in medical education. An evaluation into students' knowledge of impact of women and their achievements as scientists in Rwanda could help inspire younger generations in taking up careers and also show them the possibilities available in medical or health careers.

Other factors to be considered for evaluation include: teacher influence, school counsellors and counselling services, peer influence, work environment, parental influence etc. The knowledge of this factors will significantly improve the government's efforts in ensuring gender balance in anatomy and other related fields teaching with underrepresented female personnel. Anatomy as a field has greatly benefited from notable female anatomist and their works serve as inspiration for women pursuing careers in the field and other related medical subjects. Having female lecturers in anatomy could improve the gender disparity through role modelling and mentorship, networking and opportunities, limiting stereotypes and bias, and fostering more support and understanding of female challenges in the subject matter.

This study benefitted immensely from the proper record keeping and validation of the Human Anatomy Department of the University of Rwanda. The academic records over the years were detailed and easily accessible. Some of the challenges encountered were the distortion of smooth academic running during the Covid-19 break and access to laboratory credentials of the students during this period. However, the results used in the study had both theoretical and practical components of the anatomy modules.

Even though the records were easily accessible, marks were in different database in regards to the Department, it was therefore difficult to compile all marks together for comparison. The academic marks record database didn't show the performance level of students, the researchers were the ones to categorize students' performance levels. Besides this, the records showed students who failed but didn't provide further information either the student retook some courses or retook the whole academic year.

CONCLUSION

The present study demonstrates no significant difference between males and females. It indicates that gender difference doesn't affect student performance if both gender is given the same opportunity. Further studies should be done to identify the reason why females are underrepresented in Medical sciences at the University of Rwanda.

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