e-ISSN: 0975-1556, p-ISSN:2820-2643
Available online on www.ijpcr.com
International Journal of Pharmaceutical and Clinical Research 2024; 16(6); 2338-2341

Original Research Article

A Quiz as an Academic Tool for Teaching Learning Physiology in Indian Medical Students: A Cross Sectional Study

Sanjay Kumar Gupta[1], Richa Singh[2], Rajiva Kumar Singh[3]

[1]Tutor, Department of Physiology, Patna Medical College and Hospital, Patna
[2]Tutor, Department of Physiology, Patna Medical College and Hospital, Patna
[3]Professor and HOD, Department of Physiology, Patna Medical College and Hospital, Patna

Received: 25-04-2024 / Revised: 23-05-2024 / Accepted: 08-06-2024
Corresponding Author: Dr. Richa Singh
Conflict of interest: Nil

Abstract:

Background: In medical education, innovative teaching methods are essential to enhance knowledge retention and practical application. Quizzes have emerged as a valuable tool in reinforcing learning through active engagement and immediate feedback, particularly in complex subjects such as Physiology.

Aim: This study aimed to evaluate the effectiveness of quizzes as an academic tool in teaching Physiology to Indian medical students at Patna Medical College and Hospital, Patna.

Methods: Participants were administered a series of quizzes covering various Physiology topics. Data on quiz scores, demographic information, and previous academic performance were collected. Statistical analysis was performed using SPSS version 23.0 to compare quiz scores across different groups.

Results: The average quiz score was 72.5 ± 10.3, with scores ranging from 50 to 95. No significant gender differences in quiz scores were observed ($p = 0.089$). Previous academic performance significantly influenced quiz scores, with high performers scoring higher (78.5 ± 8.6) than medium (70.4 ± 10.2) and low performers (66.8 ± 9.7) ($p < 0.01$). Age did not significantly correlate with quiz scores ($r = 0.15$, $p = 0.18$).

Conclusion: Quizzes are an effective tool for enhancing learning and understanding of Physiology among medical students. While previous academic performance impacts quiz scores, gender and age do not significantly influence outcomes.

Recommendations: Incorporating quizzes into the medical curriculum can provide ongoing assessment and reinforce learning. Further research should explore the long-term benefits and potential integration of quizzes into other areas of medical education.

Keywords: Quizzes, Medical Education, Physiology, Active Learning, Academic Performance.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0) and the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/read), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The field of medical education continuously evolves, driven by the need to equip future healthcare professionals with comprehensive knowledge and practical skills. Traditional teaching methods, primarily didactic lectures, have been supplemented by various innovative educational tools aimed at enhancing learning and retention. Among these tools, quizzes have gained prominence for their potential to reinforce learning through active engagement and immediate feedback [1]. Quizzes, by fostering frequent review and self-assessment, can bridge the gap between theoretical knowledge and practical application, which is critical in medical education.

Recent research highlights the benefits of active learning strategies, including quizzes, in improving academic performance and knowledge retention. According to a study, active learning strategies, such as quizzes, not only engage students but also enhance their understanding and retention of complex concepts [2]. This is particularly pertinent in the study of Physiology, where the integration of theoretical knowledge with clinical application is essential. Studies shown that frequent testing, a key component of quizzes, improves long-term retention and understanding of material compared to traditional study methods [3].

The importance of tailored educational strategies is underscored by the diverse backgrounds and learning styles of medical students. Incorporating quizzes can cater to different learning preferences, providing immediate feedback and opportunities for self-assessment. This aligns with the findings of a study, who emphasize the importance of frequent assessment in identifying gaps in knowledge and reinforcing learning [4].

Moreover, the application of quizzes in medical education aligns with the competency-based medical education (CBME) framework, which emphasizes measurable outcomes and continuous

assessment [5]. Quizzes can serve as a valuable tool in this framework, providing regular checkpoints for assessing students' progress and understanding.

This study aimed to evaluate the effectiveness of quizzes as an academic tool in teaching Physiology to Indian medical students at Patna Medical College and Hospital.

Methodology

Study Design: This was a cross-sectional study.

Study Setting: The study was conducted at Patna Medical College and Hospital, Patna, from January 2020 to December 2020.

Participants: A total of 84 participants were included in the study.

Inclusion Criteria

- Medical students currently enrolled in the Physiology course at Patna Medical College and Hospital.
- Age group of students are more than 18 years.
- Students who consented to participate in the study.

Exclusion Criteria

- Students who did not consent to participate.
- Students who were absent during the quiz sessions.

Bias: To minimize selection bias, all eligible students were invited to participate, and data were collected uniformly. Efforts were made to ensure that the quiz content was unbiased and covered a broad range of topics within the Physiology curriculum.

Data Collection: Data were collected using a structured questionnaire and quiz results. Demographic and academic performance data were gathered through student records, while quiz scores were obtained directly from the administered quizzes.

Procedure: Participants were administered a series of quizzes designed to test their knowledge of Physiology. The quizzes were structured to cover various topics within the subject. Each quiz session was conducted under standardized conditions to ensure consistency. Participants' responses were recorded, and their performance was evaluated based on the scores achieved in the quizzes.

Statistical Analysis: Data were entered and analyzed using SPSS version 23.0. Descriptive statistics were used to summarize the demographic data and quiz scores. Inferential statistics, including t-tests and ANOVA, were employed to compare quiz scores across different demographic groups and previous academic performance categories. A p-value of less than 0.05 was considered statistically significant.

Result

A total of 84 students participated in the study. The demographic characteristics of the participants are summarized in Table 1.

Table 1: Demographic Characteristics of Participants

Characteristic	Frequency (n=84)	Percentage (%)
Age (years)		
18-20	50	59.5
21-23	30	35.7
>23	4	4.8
Gender		
Male	45	53.6
Female	39	46.4

The average quiz score among participants was 72.5 ± 10.3. Quiz scores ranged from a minimum of 50 to a maximum of 95. The distribution of quiz scores is presented in Table 2.

Table 2: Distribution of Quiz Scores

Score Range	Frequency (n=84)	Percentage (%)
50-59	10	11.9
60-69	20	23.8
70-79	30	35.7
80-89	18	21.4
90-95	6	7.2

The mean quiz score for male participants was 74.2 ± 9.8, while the mean score for female participants was 70.6 ± 10.7. An independent t-test showed no statistically significant difference between male and female quiz scores ($t = 1.72$, $p = 0.089$).

Table 3: Comparison of Quiz Scores by Gender

Gender	Mean Score	Standard Deviation	t-value	p-value
Male	74.2	9.8	1.72	0.089
Female	70.6	10.7		

Participants were grouped based on their previous academic performance (high, medium, low) to assess its impact on quiz scores. The mean quiz scores for these groups are shown in Table 4. ANOVA revealed a statistically significant difference in quiz scores among the groups ($F = 6.89$, $p < 0.01$).

Table 4: Impact of Previous Academic Performance on Quiz Scores

Academic Performance	Frequency (n=84)	Mean Score	Standard Deviation
High	28	78.5	8.6
Medium	32	70.4	10.2
Low	24	66.8	9.7

Post-hoc analysis using Tukey's HSD test indicated that the high academic performance group scored significantly higher than both the medium and low performance groups ($p < 0.01$ for both comparisons).

The relationship between age and quiz scores was analyzed using Pearson's correlation coefficient, which showed a weak, non-significant correlation ($r = 0.15$, $p = 0.18$).

Discussion

The study involved 84 medical students with a fairly even gender distribution with 53.6% males and 46.4% females. Most students were between the ages of 18-20 (59.5%), followed by 21-23 (35.7%), and a small percentage were over 23 years old (4.8%).

The average quiz score among participants was 72.5 with a standard deviation of 10.3, indicating a moderate level of variability in student performance. Scores ranged from 50 to 95, with the majority (35.7%) scoring between 70-79. This suggests that while most students performed reasonably well, there was a spread of scores indicating differing levels of understanding or preparation among the participants.

When comparing quiz scores by gender, the mean score for male students was slightly higher (74.2) than for female students (70.6). However, this difference was not statistically significant ($p = 0.089$), indicating that gender did not play a significant role in quiz performance. This suggests that both male and female students had similar levels of knowledge and understanding of the Physiology content tested.

The study found a significant impact of previous academic performance on quiz scores. Students with high previous academic performance scored significantly higher on the quizzes (mean score 78.5) compared to those with medium (70.4) and low (66.8) academic performance. This indicates that students who have performed well academically in the past are likely to continue performing well in their current studies, perhaps due to better study habits, understanding of the material, or other factors related to academic success.

Finally, the correlation between age and quiz scores was weak and non-significant ($r = 0.15$, $p = 0.18$), suggesting that age did not have a substantial impact on the performance of the students in the quizzes. This implies that students' understanding of Physiology, as assessed by the quizzes, was relatively consistent across different age groups within the study sample.

Overall, the use of quizzes as an academic tool for teaching Physiology proved to be effective, with performance largely influenced by students' previous academic achievements. The lack of significant gender differences and age effects indicates that quizzes can be a fair assessment method for diverse student populations. These findings support the integration of quizzes into the medical curriculum as a means to enhance learning and provide ongoing assessment of student understanding. Further research could investigate the long-term benefits of this approach and its potential to improve overall educational outcomes in medical education.

A cross-sectional study assessed the effectiveness of quizzes in teaching physiology to 96 first-year medical students. The quizzes were organized every 3-4 weeks, and feedback was collected using a Likert scale. Results indicated that 49% of students strongly liked the quiz format, 40% liked it, and only 1% did not like it. The majority appreciated the contents, organization, and various aspects of the quiz, such as team formation, scoring, and difficulty level, suggesting quizzes are beneficial and should be part of the curriculum [6].

In a study, 68 second-year MBBS students were divided into two groups to compare the learning outcomes of didactic lectures versus self-study followed by quizzes in clinical microbiology. Feedback indicated that students found quizzes more engaging and motivating, enhancing their interest and involvement in the subject. The study

concluded that quizzes are effective adjunctive learning tools [7].

A study involved 200 first-year MBBS students participating in a Physiology Quiz Competition, conducted in four rounds (MCQ, explanatory, rapid fire, and image-based). Feedback revealed that 67% of students found the quiz an excellent teaching and learning method, with rounds R1 and R2 being more academically beneficial and rounds R3 and R4 more entertaining. Overall, students endorsed the quiz as an innovative and interesting learning method [8].

A cross-sectional study assessed the perception of a national level quiz conducted by the Physiology Department at AIIMS, Bhopal. Feedback from 29 participants indicated that the majority found the quiz a good learning experience, enhancing their interest in physiology and developing novel ideas. The quiz was perceived as beneficial for improving communication skills and clinical practice, with 86% of students suggesting an online screening round and preferring the audiovisual and rapid-fire rounds [9].

A study investigated the effectiveness of team-based learning (TBL) in preparing for the International Inter-Medical School Physiology Quiz. Five students were selected based on academic performance and participated in TBL sessions. The team achieved a significant improvement, entering the top forty teams in the competition for the first time. The study concluded that TBL is an effective preparation method for academic quizzes [10].

Conclusion

The study demonstrated that quizzes are an effective academic tool for assessing and enhancing the understanding of Physiology among Indian medical students. Although no significant gender differences were observed, previous academic performance significantly influenced quiz scores. Further research is recommended to explore the long-term impact of quizzes on learning outcomes and their potential integration into the medical curriculum.

References

1. Brown PC, Roediger HL, McDaniel MA. Make It Stick: The Science of Successful Learning. Harvard University Press; 2018.
2. Carraccio C, Englander R, Holmboe ES, Kogan JR. Driving Care Quality: Aligning Trainee Assessment and Supervision With the Needs of Patients and Families. Acad Med. 20 20;95(5):710-7.
3. Kibble JD. Best practices in summative assessment. Adv Physiol Educ. 2017;41(1):110-9
4. McDaniel MA, Anderson JL, Derbish MH, Morrisette N. Testing the testing effect in the classroom. Eur J Cogn Psychol. 2019;21(6): 681-95.
5. Pashler H, Rohrer D, Cepeda NJ, Carpenter SK. Enhancing learning and retarding forgetting: Choices and consequences. Psychon Bull Rev. 2018;14(2):187-93.
6. Agrawal M, Singh J, Patel D, Goel A, Kathrotia R, Patil PM. Quiz as an academic tool for teaching learning physiology in Indian medical students: A cross-sectional study. Indian J Physiol Allied Sci. 2022.
7. Mehta A, Bansal H, Tripathi K. Perception of quiz as an adjunctive learning modality in clinical microbiology amongst medical students of central India. J Med Sci Res. 2021.
8. Mistry HA, Pathak N, Desai D, Dulera S, Mandli R. Physiology Quiz Competition - the Game of Education or Entertainment? Adv Physiol Educ. 2023.
9. Thakare A, Hulke S, Birajdar GA, Parashar R, Wakode S, Bharshankar R. Innovative Approach of Learning Physiology through National Level Quiz. Mymensingh Med J. 2023; 32:870-874.
10. Bian H, Bian Y. Team-Based Learning in a Physiology Course To Prepare for The International Inter-Medical School Physiology Written Quiz in Kunming Medical University. Preprint 2021.