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Original Article

# Reinvigorating Pathology Museum-Based Learning: Insights from Students

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## ABSTRACT

This study explored the impact of pathology museum teaching from the perspective of undergraduate medical students. A group of 32 fourth-term students from Malabar Medical College were randomly selected, and verbal consent was obtained before participation. Following a dedicated museum teaching session, students completed a self-administered questionnaire, and their responses were analyzed to assess their perceptions.

The participants had a mean age of 21 years, and a majority (68.7%) reported visiting the museum at least once each week. Most students (65.6%) felt that the existing 20-minute duration allotted for pathology museum sessions was insufficient. Nearly all participants (96.8%) agreed that the museum sessions played a positive role in enhancing their understanding and overall learning experience in pathology. Furthermore, 78.1% believed that such sessions were most effective when conducted in small groups of 6–10 students. All students unanimously stated that the pathology museum required further improvement to optimize its educational value.

Overall, the findings suggest that pathology museum–based teaching is a highly effective learning approach that supports deeper understanding of the subject. Conducting these sessions in small groups appears to enhance their impact, reinforcing the need for structured improvements to maximize the museum's role in pathology education.

***Keywords****: Pathology museum, Teaching method, Small groups, Effective self-learning.*

## INTRODUCTION

Medical museums have long played a pivotal role in the education of medical students, serving as vital tools for teaching anatomy, pathology, and surgery to both undergraduate and postgraduate learners. Historically, pathology museums functioned as rich repositories of preserved specimens, models, and exhibits that offered students a tangible understanding of disease processes [1]. A well-organized and systematically maintained pathology museum provides invaluable information on a wide range of diseases, enabling students to correlate theoretical knowledge with real pathological manifestations. For this reason, regular museum visits have traditionally been regarded as an essential component of effective pathology teaching for medical students [2].

However, over the years, several challenges have contributed to a gradual decline in the prominence of pathology museums as mainstream teaching tools. Many institutions have faced constraints related to space, logistics, and budget [3]. In certain colleges, limitations in infrastructure forced the creation of smaller satellite museums distributed across departments rather than a single unified facility. In others, priority shifted toward research, leading to museum spaces being converted into research labs or areas for advanced diagnostic work. These structural changes often resulted in reduced accessibility for students, diminishing the museum's intended educational impact [4].

Additionally, rapid advancements in digital technology and the increasing availability of virtual learning tools have altered the landscape of medical education. High-resolution imaging, digital pathology platforms, 3D models, and virtual simulators offer convenient alternatives to traditional museum-based learning [5]. While these technological innovations have undoubtedly enhanced medical training, they have also inadvertently contributed to the reduced utilization of physical pathology museums. Many institutions now rely heavily on technology-driven resources, further accelerating the shift away from specimen-based museum teaching [6].

For newly established medical colleges, the challenges are even more significant. Setting up a functional pathology museum requires substantial initial investment and the recruitment of trained technical staff capable of maintaining specimens and displays. Due to these considerations, some colleges choose to forego establishing a museum altogether, despite its educational benefits [7]. On the other hand, exemplary institutions such as the Anatomical Museum at Leiden University Medical Centre have embraced modernization, integrating advanced technology into their museum spaces to create interactive and engaging learning environments. These upgraded museums demonstrate that traditional specimen-based learning can coexist with modern teaching tools when thoughtfully integrated [8].

Recognizing the decline in museum-based learning and its potential consequences on student understanding of pathology, the present study was undertaken to assess the relevance and impact of pathology museum teaching in our institution. By exploring the perceptions of undergraduate pathology students, the study aims to understand how museum sessions contribute to their learning, how frequently they utilize the museum, and whether they perceive the current structure as adequate or in need of improvement [9]. Evaluating student perspectives is essential to determining whether pathology museums remain valuable in contemporary medical education and how they can be revitalized to meet evolving academic needs [10].

Ultimately, this study seeks to highlight the continuing importance of pathology museums as interactive teaching tools, while acknowledging the need for modernization to ensure their sustained relevance in medical training.

## METHODOLOGY

### Study Objective

The primary objective of this study was to evaluate the effectiveness of pathology museum teaching from the perspective of undergraduate medical students.

### Ethical Approval

The study was conducted as part of the Basic Course in Medical Education. Ethical clearance was obtained from the Institutional Ethics Committee prior to the commencement of the study. Participation was voluntary, and informed consent was obtained from all students.

### Study Design and Participants

This was a cross-sectional descriptive study involving **32 fourth-term MBBS students** from Malabar Medical College who volunteered to participate. The purpose of the study and the procedures involved were clearly explained to all participants before recruitment.

### Teaching Intervention

The study was designed around an integrated teaching session combining conventional lectures with museum-based learning:

1. **Lecture Sessions:** Participants first attended **two lecture classes**, each lasting **40 minutes**, covering selected pathology topics.
2. **Museum Session:** After the lectures, students were taken to the pathology museum for a **20-minute guided session**. During this visit, the specimens relevant to the lecture topics were demonstrated and explained in detail by the faculty.

### Data Collection Tool

A **self-administered questionnaire** was distributed to all participants immediately after completion of the museum session. The questionnaire consisted of **ten structured questions** designed to assess students' perceptions of the usefulness, adequacy, and effectiveness of museum-based teaching.

### Data Analysis

Completed questionnaires were collected and reviewed. The responses were analyzed descriptively by the investigator to evaluate students' views on the duration, effectiveness, and overall impact of pathology museum teaching.

## RESULTS

A total of **32 undergraduate students** participated in the study. The mean age of the students was **21 years**, with ages ranging from 20 to 23 years. The frequency of students' visits to the pathology museum is presented in **Table 1**, with **68.7%** reporting weekly visits, while 25.1% visited the museum only when required.

**Table 1.** Frequency of Students' Visits to the Pathology Museum (N = 32)

| **Frequency of Visit** | **Number of Students (%)** |
|---|---|
| Weekly | 68.7% |
| Monthly | 6.2% |
| Only when required | 25.1% |

The primary reason reported for not visiting the museum regularly was lack of interest. A large majority (**95.6%**) preferred visiting the museum immediately after lecture classes, as they felt this timing improved comprehension of the subject matter. Details of preferred visiting times are summarized in **Table 2**.

**Table 2.** Preferred Time to Visit the Pathology Museum

| **Preferred Time** | **Percentage (%)** |
|---|---|
| Before lecture class | 1.0% |
| After lecture class | 95.6% |
| Free time between classes | 3.4% |

Regarding the duration of museum sessions, **65.6%** of students felt that the allotted **20 minutes** was insufficient and suggested increasing the session time to at least 30 minutes. The data are shown in **Table 3**.

**Table 3.** Adequacy of the 20-Minute Session Duration

| **Response** | **Percentage (%)** |
|---|---|
| Adequate | 34.4% |
| Not adequate | 65.6% |

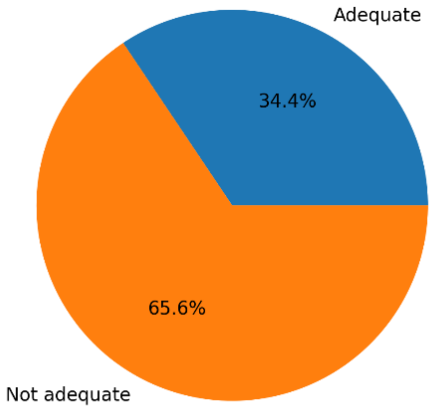


**Figure 1:** Adequacy of the 20-Minute Session Duration

Students strongly acknowledged the educational value of pathology museum teaching. Nearly all participants (**96.8%**) agreed that the sessions significantly enhanced understanding of pathology concepts and supported self-directed learning. Furthermore, **78.1%** believed that museum teaching is most effective when conducted in **small groups of 6–10 students**, enabling better viewing and individualized attention (Table 4).

**Table 4.** Perceived Effectiveness of Museum Teaching in Small Groups

| **Group Size Preference** | **Percentage (%)** |
|---|---|
| Effective in small groups (6–10) | 78.1% |
| No specific preference | 21.9% |

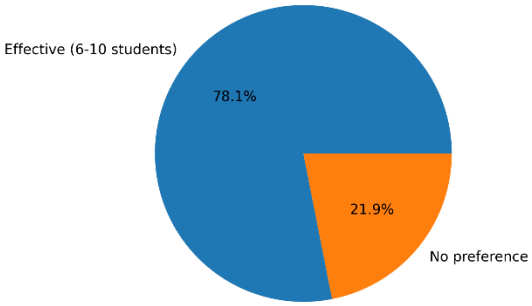


**Figure 2.** Perceived Effectiveness of Museum Teaching in Small Groups

Almost all students (**96.8%**) felt that pathology museum sessions should be routinely incorporated into the regular pathology teaching schedule. Additionally, **84.3%** agreed that these sessions should be included during final-year clinical postings to facilitate improved clinical correlation (Table 5 and Table 6).

**Table 5.** Opinion on Including Museum Sessions in Regular Teaching

| **Opinion** | **Percentage (%)** |
|---|---|
| Should be included | 96.8% |
| Not required | 3.2% |

**Table 6.** Opinion on Including Museum Teaching in Final-Year Postings

| **Opinion** | **Percentage (%)** |
|---|---|
| Agree | 84.3% |
| No opinion | 12.5% |
| Disagree | 3.2% |

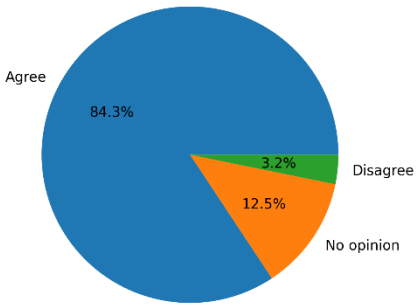


**Figure 3:** Opinion on Including Museum Teaching in Final-Year Postings

All students (**100%**) agreed that the pathology museum required improvement. Their suggestions for enhancing the museum environment are summarized in **Table 7**, with **65.6%** recommending physical rearrangement for more space and better lighting, while others suggested adding digital components or educational models.

**Table 7.** Suggested Improvements for the Pathology Museum

| **Suggested Improvement** | **Percentage (%)** |
|---|---|
| Physical rearrangement (space/light) | 65.6% |
| Digital components | 18.1% |
| Charts and models | 17.1% |

Overall, the findings clearly indicate that students perceive pathology museum teaching as a valuable and effective educational tool, while emphasizing the need for infrastructural and technological upgrades to further enhance learning outcomes.

## DISCUSSION

The current paper offers insights into the future applicability and didactic importance of pathology museum-based learning in the evaluation of undergraduate medical education in the face of the growing prevalence of digital learning tools and technology-based teaching methods. The results prove that students highly value the museum as a powerful tool of supporting the concepts of pathology and enhancing their understanding of the processes of diseases. This is in line with the recent literature that underscores the lasting significance of specimen-based learning in the provision of the linkage between theoretical knowledge and the actual manifestation of pathological conditions [11].

Among the interesting facts that are noticed in this study is that the number of students who visit museums is very high with most of them having reported visiting the museums on a weekly basis. This is an indication that, in their presence, and when properly incorporated in the curriculum, pathology museums are inherently stimulating to self-directed learning. The museum is viewed by the students as a conducive place where they can revise and put into context what they have been presented in lectures. Furthermore, the fact that visiting is preferred the most and right after the classes means that the most effective exposure to museums is the ability to use them as a continuation of the teaching sessions in order to visualise the theory and reinforce it right after it [12].

Museum session time was contended as an area of concern as most of the students believed that the time given to them was inadequate i.e. 20 minutes. This highlights the necessity of formal and prolonged museum learning experience. The 30-minute recommendation corresponds to the time that is needed to adequately observe specimens, have a meaningful conversation and process information being shown. Such sessions might be restricted by time factors causing a decrease in effectiveness and possible advantages of experiential learning [13].

The other important finding is that the museum setting has a strong preference towards small-group teaching. The students had the view that groups of 6-10 were most effective in terms of interaction, individual attention and visibility of specimens. This conforms to the pedagogical benefits of small-group learning that are increased participation, increased inquiry, and instructor-specific feedback. Museum sessions might thus maximize their teaching potential through incorporation of small-group rotations [14].

The fact that all students were in unison that the pathology museum should be to be improved points to how the museum facilities should be institutionally invested in. A majority of the students recommended physical rearrangement to enhance lighting and space whilst others proposed digital improvements like interactive modules or improved display systems. The introduction of modern technology into the conventional museum pedagogy has the potential to establish a blended learning space that would be appealing to the contemporary learners who are used to using digital devices. Museum infrastructure improvement can also serve to keep the interest of students and make museum-based instruction up-to-date and interesting [15].

The overwhelming effect in favor of inclusion of museum sessions in regular teaching and the clinical postings also goes to show how significantly the museum is viewed as helping to improve clinical correlation. Real objects can supplement diagnostic knowledge and help to train observational skills, which are the basis of clinical reasoning [16].

**Limitations**

This study, while valuable in understanding student perspectives on pathology museum teaching, has several limitations that should be acknowledged. First, the sample size was relatively small, with only 32 participants from a single medical college. This limits the generalizability of the findings to broader student populations and other institutions with different teaching environments or museum facilities.

Second, the study relied on **self-reported data** obtained through a questionnaire. Such responses may be influenced by recall bias or social desirability bias, where students may provide answers they believe are expected rather than their true perceptions. Additionally, the questionnaire contained closed-ended questions, which may have restricted students from fully expressing detailed opinions or suggestions.

Third, the study assessed the immediate perceptions of students after a single museum session integrated with lecture classes. It did not evaluate long-term retention of knowledge, improvement in examination performance, or enhancement in clinical skills. Therefore, the actual educational impact of museum-based teaching over time remains unknown.

Another limitation is that the study did not compare museum-based teaching with other teaching modalities such as digital pathology, virtual simulations, or problem-based learning. As a result, it is difficult to determine whether the museum approach is superior or merely complementary to other methods.

Finally, the study did not account for variability in students' baseline interest in pathology, prior exposure to museum learning, or individual learning styles, all of which could affect their perceptions. Differences in faculty teaching strategies during the museum session may also influence student responses but were not evaluated.

Despite these limitations, the findings provide valuable insight into student attitudes toward pathology museum teaching and highlight the need for further research involving larger, multi-centric studies with objective learning outcome measures.

## CONCLUSION

Altogether, the findings of the current research support the necessity to save and restore pathology museums as an important part of medical education. As the technology is constantly changing, the pedagogic value of the analysis of actual pathological specimens cannot be compared with that of other types of analysis. Museums offer a hands-on learning experience that cannot be replaced by lectures and digital materials. Modernization of museum space, increase in accessibility, and incorporating museum-based sessions further into the curriculum can play an important role in improving the quality of pathology education in medical institutions.

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