

ORIGINAL ARTICLE

HISTOPATHOLOGY PRACTICAL SESSIONS AND THE THEORETICAL KNOWLEDGE OF PATHOLOGY: CORRELATION AND STUDENTS' PERCEPTION**Hania Naveed, Ghazala Mudassir*, Safina Ahmed*, Maryam Habib**, Mahwish Majid Bhatti***, Rifat Nadeem Ahmed†**

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Background: Histopathology practical sessions constitute a substantial bulk of pathology teaching in undergraduate medical school. This study aimed to assess the correlation between students' scores in histopathology practical and pathology theoretical examinations and to explore the students' perception.

Methods: It was a prospective observational study conducted amongst 109 third year medical students at Shifa College of Medicine from 1st June 2019 to 30th March 2020. The histopathology practical were conducted through traditional microscopy sessions. Mean histopathology summative scores of 9 modules were correlated with the respective block integrated practical examination (IPE) scores. The perception of students regarding histopathology practical was explored through a questionnaire which comprised of eight items to be rated on a three-point Likert scale. **Results:** Correlation between the mean summative score with their respective IPE scores showed weak positive correlation (Block I: $r=0.489$, $p<0.0001$; Block II: $r=0.468$, $p<0.0001$; Block III: $r=0.445$, $p<0.0001$). Performance in IPE was found to be a weak predictor of performance in summative examination with an adjusted R^2 of 0.194 in block I, 0.199 in block II and 0.201 in block III ($p<0.0001$). The questionnaire responses showed that students have difficulty in understanding the microscopic findings and they find it difficult to correlate them with the theoretical knowledge. **Conclusion:** There was no significant correlation between the students' scores in histopathology practical and pathology theoretical examinations. The practical sessions need to be consigned and innovated with theoretical/clinical relevance in demonstration to augment basic pathological theory concepts and learning.

Keywords: Medical, Pathology, Perception, Students, Clinical relevance, Histopathology, Learning

Pak J Physiol 2022;18(4):27-30

INTRODUCTION

Undergraduate medical teaching has evolved in the past few years from an isolated discipline-based curriculum to an integrated, competency-based approach. Small group discussions, problem-based learning, case-based discussions have replaced seemingly arid lectures.¹ This changing paradigm in medical schools has revamped the incorporation of basic science knowledge with practice-based medicine with the sole purpose to enhance the learning environment for medical students. In this regard, formal concept of exit competencies are gaining popularity. They are defined as expected skills required from a medical graduate to dexterously practice the medical concepts for effective patient management.²

Pathology in undergraduate medical schools is taught as part of the basic year sciences. To adequately treat the patients it is imperative to understand the disease pathogenesis to diagnose and manage them. The core competencies for pathology in the basic years are focused more on understanding the basic concepts of pathology including the disease pathogenesis, principles, and mechanism of general pathology, the morphology, and prognosis of the disease. The clinical competencies of pathology which are taught in practical sessions have a pivotal role in medicine that cannot be ignored. Appropriate and judicious use of laboratory tests saves

time and proper interpretation leads to correct diagnosis and treatment.³ Although attempts have been made in defining the practical competencies for pathology in undergraduate medical teaching, the formal teaching of these competencies is lacking in many medical schools. When transitioning from the preclinical to clinical years the students are expected to use their theoretical knowledge of pathology to interpret the laboratory findings in the clinical years.⁴ Their lack of formal training during the delivery of the pathology curriculum increases the difficulty level of the clinical year sciences and thus the stress level of students.⁵

Histopathology is an important sub-specialty of pathology which is taught in the practical sessions via microscopic examination of the tissues on H and E stained slides of cases showing features of general pathology along with a major component of special pathology.⁶ While the main concept behind teaching the histopathological aspect of diseases is to make them correlate the pathogenesis and a better understanding of the disease, the traditional way of carrying these practical sessions leads to a lack of clinical application at the undergraduate level. These sessions have little impact on the practical competencies of a general physician.

Expecting an undergraduate medical student to diagnose a case based on the microscopic examination of



H and E stained slides during practical examination is unjust, unless aligned with learning outcomes and teaching. Considering detailed and extensive conduction of histopathology practical sessions, we aimed to evaluate their impact on students’ theoretical knowledge correlating practical assessment scores with theory scores, and to explore students’ perspectives of these practical sessions.

MATERIALS AND METHODS

It was a prospective observational study conducted amongst 109 third year medical students at Shifa College of Medicine from 1st June 2019 to 30th March 2020. Convenience sampling was used for data collection. Institutional Review Board (IRB#124-614-2019) approval was taken before the start of the study.

Histopathology, as a component of pathology, was taught in an integrated fashion with general pathology and pharmacology in 9 different modules throughout the year III. A summative examination was conducted at the end of every module which included variable number of histopathology MCQs depending on the duration of module and content. Three integrated practical examinations (IPE) were conducted in a year, after every three modules. Histopathology practical curriculum was assessed at different stations during this exam. Each histopathology station had a brief history of the case along with H and E stained glass slides and gross specimens of original cases which were shown to the students during practical sessions. The slides were fixed under the 20× or 40× power of the microscope and they were not aided by the pointer head.

Summative examination of three modules in block I had a total of 53 MCQs of histopathology assessed in three modules, while block I IPE had six practical stations with a maximum score of 40. Summative examinations in block II included total 42 MCQs of histopathology assessed in three modules, while block II IPE had six stations with a maximum score of 25. Block III summative examination had 40 MCQs of histopathology assessed in three modules, and block III IPE had six stations with a total score of 25. Correlation was checked between histopathology summative scores of 109 students with their respective histopathology IPE scores.

The perception of students regarding the impact of histopathology practical sessions on their learning was explored by administering a questionnaire. The questionnaire comprised of 8 items for rating on a 3 point Likert scale. The reliability and validity of the questionnaire were checked before its distribution to the students. Reliability was calculated by Cronbach’s alpha for the questionnaire items which was calculated to be 0.829 which is a reliable score for internal consistency.

While the face and content validity was done through review of the items by two subject specialists.

The questionnaire was administered during Block III after exposing the students to majority of the practical sessions, two IPEs and seven summative examinations. It was a paper-based questionnaire format that was distributed during a histopathology practical session. Before its distribution, the students were informed about the purpose of the study and written informed consent was obtained from them.

The data was entered and analysed using SPSS-23. Quantitative analysis was described using mean and standard deviations. Shapiro-Wilk test was applied to check for normality of distribution. Spearman correlation test was used for correlation between mean IPE and MCQ summative scores, and $p < 0.05$ was considered as significant.

RESULTS

Year III at Shifa College of Medicine comprised 109 students including 58 males and 51 females. The mean MCQ score in each block and the mean IPE scores are shown in Table-1.

The mean MCQ score showed a slight difference in each block. However, the mean IPE score declined and it was recorded to be the lowest in block 3. Spearman’s correlation between the mean summative score of block I, II, and III with their respective IPE scores showed a weak positive correlation (Block I: $r = 0.489, p < 0.000$; Block II: $r = 0.468, p < 0.000$; Block III: $r = 0.445, p < 0.000$). Mean MCQs and IPE scores of the students are shown in Table-2.

Spearman’s correlation between the MCQs score and the IPE score showed a weak positive correlation between the two in males with r of 0.374, 0.473, and 0.388 in blocks I, II, and III respectively ($p < 0.0001$). The results of female students in all three blocks had a relatively better correlation with their IPE scores when compared to the results of the male students and their r was calculated to be 0.603, 0.463, and 0.506 in blocks I, II and III respectively ($p < 0.0001$). Regression analysis showed performance in IPE to be a weak predictor of performance in summative examination with an adjusted R^2 of 0.194 in block I, 0.199 in block II and 0.201 in block III ($p < 0.0001$). Eighty-eight (80.7%) students filled the questionnaire. The students’ responses are shown in Table-3.

Table-1: Mean MCQ and IPE scores in all blocks

	Block I	Block II	Block III
Maximum MCQs score	53	42	40
MCQs score (Mean±SD)	36.2±4.8	31.1±4.3	30.5±4.4
Total IPE stations score	40	25	25
IPE score (Mean±SD)	38.0±7.7	19.0±5.6	13.3±7.5

Table-2: Mean MCQs and IPE scores of male and female students (Mean±SD)

Gender	Block I				Block II				Block III			
	MCQs score	IPE score	r	p	MCQs score	IPE score	r	p	MCQs score	IPE score	r	p
Male	36±4.6	37.3±6.3	0.374	<0.0001	31.2±3.7	18.2±5.8	0.473	<0.0001	30.5±4.2	12.8±7.7	0.388	<0.0001
Female	36.4±5.0	38.7±9.0	0.603	<0.0001	30.9±4.9	19.9±5.4	0.463	<0.0001	30.6±4.7	14.0±7.3	0.506	<0.0001

**Table-3: Students' perception of histopathology practical sessions [n (%)]**

Questions	Agree	Neutral	Not Agree
1) Histopathology practical sessions increase my pathology knowledge and lead to a better understanding of the subject.	51 (58.0)	18 (20.5)	19 (21.6)
2) I can understand the microscopic findings of histopathology slides.	31 (35.2)	30 (34.1)	27 (30.7)
3) I can easily correlate the knowledge of practical sessions with theoretical knowledge.	43 (48.9)	24 (27.3)	21 (23.9)
4) These sessions help me in solving the histopathology summative questions.	24 (27.3)	22 (25.0)	42 (47.7)
5) Similar slides are given to me for interpretation in the future, I will be able to recall my practical knowledge.	33 (37.5)	16 (18.2)	39 (44.3)
6) I can interpret a biopsy report based on the knowledge that I have achieved in these sessions.	11 (12.5)	20 (22.7)	57 (64.8)
7) I think the number of histopathology practical sessions should be increased.	44 (50.0)	24 (27.3)	20 (22.7)
8) It is important to learn the histopathology practical for board certifying exams (USMLE/PLAB etc.).	77 (87.5)	5 (5.7)	5 (6.8)

DISCUSSION

Studying pathology on haematoxylin and eosin-stained slides under the microscope has never gained popularity and has been considered one of the most poorly understood subjects of undergraduate medical education. We studied the correlation between the histopathology examination scores of students in written and practical examinations and found a weak positive correlation between the two ($p < 0.000$) in all three blocks. Results of female students correlated relatively better when compared to male students.

Similar studies where practical scores were correlated with theory scores have been done but the majority of them are clinical OSCE scores where examination scenarios were conducted on real or simulated patients.^{8,9} We couldn't find any similar study where students' performance in histopathology theory and practical examination was correlated. Patel *et al*¹⁰ studied the students' performance in theory and practical summative examination of pharmacology in medical students and found a lack of correlation between written and practical examination.

The perception recorded from the year III medical students also gave an insight into the deficiencies in practical knowledge. While we expected histopathology practical sessions to be very effective for the theoretical understanding, it was found to have a weak correlation with the students' histopathology theoretical learning. Although when asked from the students, 58% and 48.9% agreed that practical sessions increased their understanding of the subject and they can easily correlate the practical and theoretical knowledge respectively. It might not be incorrect since the practical sessions conducted included half-an-hour of tutorial by the teacher and the emphasis was more on the practical aspect of the learning objectives they learn in the small group discussion followed by an examination of the tissue under the microscope. However, the important thing learned from the students' perception was that they were unclear whether they understood anything from studying the tissue under the microscope and they were sure they won't be able to interpret the biopsy report from the knowledge they gained in these sessions.

Magid *et al*¹¹ developed consensus guidelines for practical competencies of anatomic pathology and laboratory medicine and identified two essential pathology practical competencies for undergraduate students. One of them is the effective utilization of

laboratory tests. Second one is to develop optimal knowledge to provide professional consultation in diagnostics pathology. The majority of the responders in their study agreed that submission of a specimen for histological and frozen section evaluation, interpretation of a pathology report, and accurate completion of a pathology requisition form was rendered important while reviewing the microscopic findings of a pathology specimen were not considered very important.¹¹ In the present study, the questionnaire responses showed the above-mentioned competencies as very weak. Our students reported that they couldn't understand the histological features of H and E stained slides under the light microscope and they found it difficult to interpret a biopsy based on the knowledge they acquired from these sessions.

Htwe *et al*¹² comparatively assessed the students' performance in structured pathology practical and stated that students performed better when histopathology images were given in picture plates than under the microscope. The main purpose of replacing discipline-based curriculum with integrated, competency-based teaching is better retention of basic knowledge, a clearer understanding of clinical competencies, and clinical reasoning.¹³ This has been achieved with the advent of new teaching strategies and defining of essential competencies. New teaching strategies have played a tremendous role in achieving these objectives. Holaday *et al*¹⁴, through a survey amongst the first-year medical students, identified a strong preference for electronic tools such as virtual microscopy over conventional light microscopy for histology teaching.

The learning objectives of practical sessions can follow two outcomes: one is a better understanding of the pathology subject, and the other is the practical implication as a general physician. While microscopic histopathology practical are conducted with the aim to have a good understanding of the subject, their practical implication in general practice is minimal. Defining the histopathology practical competencies becomes essential at this stage considering their limited practical application in the clinical setting and they are burdening the pathology content in the 3rd year where more focus can be placed on more important practical competencies.¹⁵ It should be limited to specific histological features rather than expecting the students to make a diagnosis by examining the tissue under the microscope which itself is difficult for the consultant

histopathologists as well. Report interpretation is more important than diagnostic competency in undergraduate medical students.

We studied the correlation of histopathology theory and practical scores in students of a single class only, which is our limitation. Similar studies should be conducted in different medical institutions to confirm these findings.

CONCLUSION

The practical sessions of histopathology conducted in undergraduate medical schools through conventional microscopy showed no significant correlation between the students' scores in histopathology practical examination and pathology theoretical exam. The practical sessions need to be consigned and innovated to augment basic and applied pathological theory concepts and to enhance retention due to their clinical relevance.

REFERENCES

1. Siermans JJ. Integrating competency-based education with a case-based or problem-based learning approach in online health sciences. *Asia Pacific Educ Rev* 2020; 21:683–96.
2. Pinder K, Ford J. Creating Milestones and Exit Competencies for Medical School Education in Histology. *FASEBJ* 2017;31(51):15–583.
3. Ford J, Pambrun C. Exit competencies in pathology and laboratory medicine for graduating medical students: the Canadian approach. *Hum Pathol* 2015;46(5):637–42.
4. Godefrooij MB, Diemers AD Scherpbier AJ. Students' perceptions about the transition to the clinical phase of a medical curriculum with preclinical patient contacts; a focus group study. *BMC Med Educ* 2010;10:28.
5. Omidifar N, Keshtkari A, Deghani M, Shokripour M. Introduction to clinical pathology: A brief course of laboratory medicine in the field for medical students. *J Educ Health Promot* 2017;6:84.
6. Laohawetwanit T. The use of virtual pathology in teaching medical students; first experience of a medical school in Thailand. *MedEdPublish* 2020;9(1):116.
7. Al-Khader Ali, Obeidat FN, Abu-Shahin N, Khouri NA, Kaddumi EG, Al-Qa'qa' S, *et al.* Medical students' perceptions of pathology and a proposed curricular integration with histology: A future vision of curricular change. *Int J Morphol* 2020;38(1):38–42.
8. Al Rushood M, Al-Eisa A. Factors predicting students' performance in the final pediatrics OSCE. *PLoS ONE* 2020;15(9):e0236484.
9. Kolivand M, Esfandyari M, Heydarpour S. Examining validity and reliability of objective structured clinical examination for evaluation of clinical skills of midwifery undergraduate students: a descriptive study. *BMC Med Educ* 2020;20(1):96.
10. Patel BS, Kubavat A, Piparva K. Correlation of student's performance in theory and practical of final summative pharmacology examination in MBBS curriculum: A critical insight. *Natl J Physiol Pharm Pharmacol* 2013;3(2):171–5.
11. Magid MS, Shah DT, Cambor CL, Conran RM, Lin AY, Peerschke EIB, *et al.* Consensus guidelines for practical competencies in anatomic pathology and laboratory medicine for the undifferentiated graduating medical student. *Acad Pathol* 2015;2(4):2374289515605336.
12. Htwe TT, Ismail SB, Low GK. Comparative assessment of students' performance and perceptions on objective structured practical models in undergraduate pathology teaching. *Singapore Med J* 2014;55(9):502–5.
13. Albanese MA, Mejicano G, Anderson WM, Gruppen L. Building a competency-based curriculum: the agony and the ecstasy. *Adv Health Sci Educ Theory Pract* 2010;15(3):439–54.
14. Holaday L, Selvig D, Purkiss J. Preference of interactive electronic versus traditional learning resources by University of Michigan medical students during the first year histology component. *Med Sci Educ* 2013;23:607–19.
15. Marshall R, Cartwright N, Mattick K. Teaching and learning pathology: a critical review of the English literature. *Med Educ* 2004;38(3):302–13.

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Received: 27 Nov 2021

Reviewed: 8 Dec 2022

Accepted: 14 Dec 2022

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Conflict of interest: None

Funding: None