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ORIGINAL RESEARCH

Perception of Preclinical Medical Students About Pathology Subject and the Teaching Methods in an Indian Medical College

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Abstract

Background: Pathology is a key subject at the pre-clinical stage of medical training.

Objectives: To determine the perception of second-year MBBS (preclinical) students regarding Pathology as a subject and the effectiveness of various teaching, learning and assessment methods.

Methods: This cross-sectional study was carried out on 145 randomly selected, second-year MBBS students, appearing for their Phase II final university exams. A predesigned questionnaire with questions about students' perception of pathology was administered to the students. The questionnaire also assessed the various teaching-learning methods currently used by the faculty. The students were also requested to make suggestions regarding the modifications needed in the teaching methods.

Results: A total of 145 out of 150 regular-batch students participated in the study. One hundred (68.9%) regarded pathology as an interesting subject; 131 (90.3%) felt pathology acts as a bridge between paraclinical and clinical branches while 107 (73.8%) found blackboard teaching more effective.

Conclusion: The study revealed that the preclinical medical students showed a favourable predisposition towards pathology as a subject while highlighting areas that need to be addressed for more effective teaching and improved learning towards producing better medical professionals.

Keywords: Medical curriculum, Medical students, Pathology, Perception, Preclinical training, Teaching methods.

Introduction

Pathology is one of the core subjects in the medical curriculum and it is ever-expanding. Pathology provides the knowledge of alteration of the physiological or normal conditions and aetiology of various diseases. This basic knowledge helps with the understanding of the pathogenesis of diseases, structural alterations of

cells (morphologic changes), and clinical manifestations forming the basis of all diagnosis and therapy. Pathology bridges the gap between the basic medical sciences and clinical medicine; this is important as a proper understanding of pathological processes is vitally important for medical practice. ^[1] Horizontal and vertical integrations also play important roles in building the clinical knowledge of students. Rafique ^[2]

also opined that integrated teaching is effective in enhancing the skill of clinicopathological correlation and thus, helps to improve the cognitive and psychomotor domains of the students. It is a known fact that periodical review of the teaching program at regular intervals will help in improving the quality of teaching-learning methods in use to improve the standard of medical education. [3]

Pathology also plays an important role in clinical practice. Blood tests have an important role in the early diagnosis of diseases, considering the information such tests make available to physicians regarding pathological processes. Another relevance is the role of biomarkers in providing information regarding the nature of diseases; an example is pneumonia, where the physician can determine whether a disease is bacterial or due to other aetiologies by analysing the results of blood tests. [3] The recent change in the treatment of COVID-19 following the discovery of coagulopathy at autopsy (in a disease initially thought to be due to pneumonia), further highlights the role of pathology in clinical practice. Autopsy findings are also crucial to a better understanding of how infections affect the human body, similar to how these findings are important to understanding other infectious diseases. [4-5] Histopathological evidence of damage to the surface layers of airway epithelial cells and massive lung involvement with diffuse alveolar damage (DAD) and microvascular thrombi have been reported in the disease. [6] Comparison of haematological parameters between mild and severe cases of COVID-19 showed significant differences in interleukin-6 (IL-6), D-Dimer, glucose (GLU), thrombin time (TT), fibrinogen (FIB) and C-Reactive Protein (CRP). [7] Fan *et al.* [8] also analysed the haematological indices of COVID-19 infected patients between the intensive care unit (ICU) and non-ICU patients.

There are different branches in Pathology; these include haematology, blood banking, histopathology and cytology. The haematology section deals with the interpretation of peripheral blood smear with special reference to anaemias and leukaemias. Similarly, the cytology section includes observation of Fine Needle Aspirates for Cytology (FNACs), ultrasound-guided FNACs, Giemsa staining and pap staining whereas the histopathology section includes tissue processing and gross specimen identification. In blood banking, students are taught about donor selection criteria, donor bleeding and cross-matching as well as rational use of blood components.

Various teaching-learning methods such as integrated, system-based and problem-based learning approaches are in use. Some of the methods of teaching pathology subject include didactic lectures, museum sessions, PBL (Problem-based learning), DSL (Directed self-learning) and SDL (Self-directed learning) packages. Museum sessions are conducted with Powerpoint slide shows of images obtained from available websites. Histopathology slides demonstration is done using virtual microscopy as well as hands-on light microscopic study, displayed laminated sheets of pathologic images (picture plates) and traditional way of using the demonstration of potted morbid specimens. [9]

In most medical schools, practical exercises are an integral part of pathology course works and the assessment of these practical exercises is important. In the assessment of medical subjects, the extensively applied Objective Structured Practical Examination (OSPE) is popularly used. [5] Other methods of assessment include the Objective Structured Clinical Examination (OSCE) and the Multiple Choice Questions (MCQ). The inclusion of MCQs in written examinations was suggested at the National Consultative meeting on review of pharmacology curriculum. [6] Buzz groups and

one-minute preceptor also assist students with good ranks in the online postgraduate entrance examinations along with improvement of their clinical knowledge and communication skills.

Recent assessment methods are attempting to increase the inter-relationship between what students need to learn and the knowledge they are expected to display. [7] Therefore, the present study was conducted to describe the perception and feedback regarding pathology as a subject among second-year (preclinical) medical students in an Indian medical college. The findings may suggest the need for revision of the current methods of teaching, learning and assessment.

Methods

This cross-sectional study was carried out on 145 out of a total of 150 second-year preclinical medical students sitting for their final professional exams at the Department of Pathology, Adesh Medical College and Hospital, Mohri, Shahbad (M), Kurukshetra, Haryana, India from September to October 2019. Students repeating the class were excluded from the study. Purposive sampling was used to select consenting students and the tenets of Helsinki's Declaration were adhered to during the study.

A pre-designed questionnaire with questions about students' perception of pathology was administered to the students. The questionnaire addressed students' perception of pathology as a subject, effectiveness of the various teaching-learning methods, methods of assessment and suggestions on the need for revision of the existing methods.

The questionnaire also tested views on the various teaching-learning methods like blackboard teaching, Powerpoint presentation,

small group discussions, and tutorials currently used by the faculty. The validity of the questionnaire was determined by experts in the department while the reliability of the questionnaire was Cronbach alpha 0.76.

The data were analysed using simple descriptive statistics like frequencies and percentages.

Results

All the 145 medical students recruited into the study responded to the questionnaire. The subjects were aged 19-1 years with a mean of 20 years. The male-to-female ratio was 1.2:1.

Table I shows that the majority of the students (100; 68.9%) reported pathology to be an interesting subject; 54.5% found systemic pathology tough while 55.9% found systemic pathology more interesting. One hundred and thirty-one (90.3%) and 137 (90.5%) of the students agreed that pathology acts as a bridge between preclinical and clinical medicine and also help them to understand clinical cases better respectively.

As shown in Table II, 86.2% of the students agreed that the lectures delivered were well organized and key points were adequately highlighted; 69.0%) were satisfied with the pace of lectures while 24.1% were dissatisfied. Also, 49.6% agreed that the lectures encouraged adequate participation of the students. About teaching-learning methods, 73.8%) regarded blackboard teaching as more effective as Powerpoint learning was monotonous with problems of file corruption, incompatible media, and equipment failure. Similarly, 85.5% of the students considered case-based discussions and histopathology light microscopy sessions to be more useful.

Table I: Students' perception of pathology as a subject

Items	Agreed	Disagreed	Did not know
Do you find Pathology:			
a. Interesting Subject	100 (68.9)	20 (13.7)	25 (17.2)
b. Difficult Subject	73 (50.3)	29 (20.0)	43 (29.7)
c. Challenging Subject	78 (55.8)	18 (12.4)	49 (33.8)
Which aspect of pathology is tougher?			
a. General Pathology	23 (15.9)	42 (28.9)	80 (55.2)
b. Systemic Pathology	79 (54.5)	26 (17.9)	40 (27.6)
c. Haematology	61 (42.0)	22 (15.2)	65 (44.8)
d. Clinical pathology	34 (23.4)	31 (21.4)	80 (55.2)
Which aspect of pathology do you find more interesting?			
a. General Pathology	62 (42.8)	25 (17.2)	58 (40.0)
b. Systemic Pathology	81 (55.9)	15 (10.3)	49 (33.8)
c. Haematology	29 (20.0)	30 (20.7)	86 (59.3)
d. Clinical pathology	54 (37.2)	11 (7.6)	80 (55.2)
Do you feel pathology is a bridge between paraclinical and clinical branches?	131 (90.4)	01 (0.7)	13 (8.9)
Does pathology help to correlate with the clinical cases?	137 (94.5)	02 (1.4)	06 (4.1)

Figures in parentheses are percentages of the total in each row

There were different methods employed for the assessment of the students. In Table III, 95.9% agreed that written exams were an effective assessment tool; 90.4% of the students believed that regular class tests improve academic performance to a great extent. The other modes of assessment reported as useful in improving knowledge and application of skills included viva voce (87.6%), case-based problems (86.9%), practical examination and spotters (84.1%).

Table IV depicts the different views and suggestions offered by the students concerning the current methods of teaching and learning. One hundred and seventeen (80.7%) felt that there was a need for change in the present

medical education system in India. Incorporation of web-based learning was favoured by 64.8% students; 82.1% agreed to the need to introduce MCQs and extended matching questions in the assessment method while 42.8% agreed with the need for OSCE and OSPE. The majority of the students (127; 87.6%) reported that timely and practical feedback to students was a useful tool, followed by the introduction of handouts at the end of the session. Eighty per cent and 74.5% of the students believed in the introduction of research methodologies in the undergraduate curriculum. Only 57.3% of students found the need for buzz groups and one-minute preceptor relevant.

Table II: Perceived effectiveness of various teaching-learning methods

<i>Content and quality</i>	<i>Agreed</i>	<i>Disagreed</i>	<i>Did not know</i>
Are the lectures well organized?	125 (86.2)	16 (11.0)	04 (2.8)
Do you feel that key points are adequately highlighted during the lectures?	125 (86.2)	09 (6.2)	11 (7.6)
Is the pace of the lectures easy to follow?	100 (69.0)	35 (24.1)	10 (6.9)
Do the lectures encourage adequate student participation?	72 (49.6)	49 (33.8)	24 (16.6)
Are the following kinds of teaching-learning methods useful for learning and understanding pathology?			
a. Blackboard teaching	107 (73.8)	18 (12.4)	20 (13.8)
b. Powerpoint presentations	84 (58.0)	45 (31.0)	16 (11.0)
c. Case-based discussions	124 (85.5)	12 (8.3)	09 (6.2)
d. Small group discussions	93 (64.1)	25 (17.2)	27 (18.7)
e. Tutorials	105 (72.4)	23 (15.9)	17 (11.7)
f. Revision classes	114 (78.7)	15 (10.3)	16 (11.0)
g. Self-directed learning	106 (73.1)	16 (11.0)	23 (15.9)
h. Integrated Teaching	90 (62.1)	12 (8.3)	43 (29.6)
i. Museum Teaching	77 (53.1)	30 (20.7)	38 (26.2)
j. Seminars	69 (47.6)	51 (35.2)	25 (17.2)
k. Histopathology light microscopy sessions	124 (85.5)	07 (4.8)	14 (9.7)

Figures in parentheses are percentages of the total in each row

Table III: Students' perception of the methods of assessment

<i>Items</i>	<i>Agreed</i>	<i>Disagreed</i>	<i>Did not know</i>
Are the following methods of assessment helpful in improving knowledge and application skills?			
a. Written exams (long essays and short answer open-ended questions)	139 (95.9)	02 (1.4)	04 (2.7)
b. Practical examination	122 (84.1)	08 (5.5)	15 (10.4)
c. <i>Viva voce</i>	127 (87.6)	14 (9.7)	04 (2.7)
d. Case-based problems	126 (86.9)	09 (6.2)	10 (6.9)
e. Spotters (instruments/gross specimens/histopathology and haematology slides/laboratory interpretation of data)	122 (84.1)	10(6.9)	13(9.0)
f. Regular class tests: Does it improves the performance?	131 (90.4)	07 (4.8)	07 (4.8)

Figures in parentheses are percentages of the total in each row

Table IV: Suggestions offered by the students

Items	Agreed	Disagreed	Did not Know
Is change needed in the present medical education system in India?	117 (80.7)	07 (4.8)	21 (14.5)
Will horizontal and vertical integration among the semesters help in improving the clinical skills and application?	110 (75.9)	09 (6.2)	26 (17.9)
Incorporation of web-based learning	94 (64.8)	25 (17.2)	26 (18.0)
Is there a need to introduce multiple choice questions and Extended Matching Questions in the assessment method?	119 (82.1)	14 (9.7)	12 (8.2)
Should OSCE and OSPE be introduced as assessment tools?	62 (42.8)	10 (6.9)	73 (50.3)
Do the methods of introduction of reflection writing by the students help to bring about constructive improvement in students as well teachers?	96 (66.2)	08 (5.5)	41 (28.3)
Is there a need to give timely and practical feedback to students?	127 (87.6)	06 (4.1)	12 (8.3)
Is the introduction of research methodologies required in the undergraduate curriculum?	108 (74.5)	12 (8.3)	25 (17.2)
Are handouts, including exercises and questions and suggested reading lists, required at the end of the session?	116 (80.0)	05 (3.4)	24 (16.6)
Is the introduction of buzz groups and a one-minute preceptor needed?	83 (57.3)	17 (11.7)	45 (31.0)

Figures in parentheses are percentages of the total in each row

OSCE - Objective Structured Clinical Examination; OSPE - Objective Structured Practical Examination

Discussion

The second-year preclinical class is a crucial period in undergraduate medical education because it is the period when the student is introduced to clinical postings and taught the aetiopathogenesis of various disease processes. [8] Shah *et al.* [8] observed that 68.5% of students found pathology interesting and 86.6% felt that the knowledge of pathology helps in clinical posting similar to the finding in the present study where 68.9% also found pathology interesting. In the study by Goyal *et al.*, [9] only 43% of the students found pathology interesting. This could be due to the degree of correlation of the aetiopathogenesis of diseases with the clinical signs and symptoms which the students encountered in their clinical rotations.

In another study by Integrated teaching refers to intercalation of the basic/preclinical subjects

with the clinical subjects. This method of teaching is effective in enhancing the skill of clinicopathological correlation and it helps with improving the cognitive and psychomotor domains of the students.[2] Shah *et al* had earlier reported that 84.2% of students agreed that integrated teaching is the most effective method of teaching that guarantees thorough understanding. [8] A similar finding was reported by Goyal *et al.* [9] and Kate *et al.* [10]

In the present study, about ninety per cent of students were satisfied with the clinical relevance and content of the lectures in pathology. Vijayan *et al.* [11] reported that 95% of students were satisfied with the clinical relevance whereas 76.6% of students were satisfied with the content of the lecture. In another study by Quadri, [3] only 41.6% and 36.3% of the students were satisfied with the relevance and content of the lectures respectively. In the present study, the students reported that regular case-based problems being

discussed in the theory classes and tutorials and correlating them with the clinical cases have provided a platform for better understanding and correlation during their clinical postings.

The majority of the students in the present study (86.2%) believed that important points in the subject were adequately highlighted and explanations were satisfactorily provided to clarify the contents of the teachings whereas Vijayan *et al.*,^[11] reported a higher frequency (93.3%). Over two-thirds of the students in the present study (69.0%) were satisfied with the delivery and pace of lectures in agreement with the findings of Vijayan *et al.*^[11] compared to 30.9% reported by Quadri *et al.*^[3] It is important to state that at the location of the present study, the pace of delivery of teachings is maintained to make the subject interesting and more understandable.

In the present study, about half of the students agreed that they were encouraged to engage in “question and answer” sessions during lectures, similar to the finding of 40.1% by Quadri.^[3] However, the frequency was higher (76.6%) in the report of Vijayan *et al.*^[11] This may be explained by the fact that students believed the traditional lectures were monotonous, continuous and difficult to concentrate on. They believed that interactions during teachings keep them active and more attentive, hence results in better understanding and more retention of the knowledge.

Among all the teaching-learning methods, a majority of the students preferred histopathology light microscopy sessions and case-based discussions in about eighty-five per cent in each case similar to the report by Shah *et al.*^[8] where 88.1% of students liked case-based learning. The students in the present study also preferred light microscopy as they believed it was more interesting, whereas case-based learning is perceived to have more relevance to the cases

encountered during clinical postings. Emerald *et al.*^[4] reported that 70% of students agreed that pathology is better understood with lectures combined with demonstrations using morbid specimens and microscopic slides. This observation leads to the upgrade of teaching facilities using an information-technology based system.

In the present study, blackboard teaching was preferred by 73.8% of students similar to 78.3% reported by Vijayan *et al.*^[11] In another study by Sharma *et al.*,^[12] only 52.7% of students found learning to be more effective with the use of blackboard while 47.3% preferred teaching by Powerpoint presentations. This observation may be explained by the fact that students may prefer conventional teaching methods compared to Powerpoint teaching which may become monotonous and a one-way mode of communication.

Most of the students in the present study agreed that group discussions facilitated by the faculty, the use of integrated teachings and Powerpoint presentation teaching (57.93%) are the most effective teaching-learning methods. This was similar to the report of Goyal *et al.*,^[9] that judicious use of audiovisual aids along with the conventional methods may be most desirable. The findings of many studies show that contemporary generations of medical students generally favour an integrated model of learning, where e-learning is combined with the traditional teaching methods, as a blended learning format.^[13, 14] In a study done by Julio *et al.*,^[15] it was stated that an integrated curriculum utilizing information technology provides an excellent opportunity to relate pathology with clinical medicine, early in the training of medical students. Therefore, upgrading the teaching facilities towards information technology-based system could improve the teaching of pathology.

^[4]

Assessment is considered the most important factor driving students' learning, as students tend to mainly focus on the materials on which assessment will be based. [11] Students believed that the assessment method should be mainly formative in type focusing on the process of learning and providing information about the improvement of knowledge and skills compared to the summative type of assessment which focuses on the outcome and provide information on attainment of knowledge and skills.[16]

In the present study, the majority of the students agreed that written exams, *viva-voce* and practical examinations were useful tools of assessment. This was similar to the findings in the study done by Vijayan et al. [11] Regular class tests were also found to improve academic performance similar to the report by Sharma *et al.* [12] Few students felt that assessment by *viva voce* and practical examinations provide a uniform, equitable and unbiased assessment of students. The majority (82.1%) of the students believed in the need to introduce MCQs and extended matching questions as assessment methods as they are believed to improve preparations for the postgraduate entrance tests. This desirability of MCQ is similar to the finding of Goyal *et al.*, [9] In the present study, less than half of the respondents believed in OSCE and OSPE as useful assessment tools perceived to be more useful as learning tools during pre-examination revision exercises. Goyal *et al* had suggested that there should be an increased emphasis on the incorporation of problem-based, contextual, self-directed learning, role-play exercises and integrated teaching into the curriculum. This desired shift from the traditional approach of teaching and assessment to a need-based approach requires a fundamental change of the roles and commitments of educators, planners and policymakers. [9] Goyal *et al*, [9] also stated that information provided through the internet was confusing because most of the times they were not able to judge which piece of information

was relevant whereas many students found online books and academic links quite useful and time-saving.

Feedback is also considered an important part of the assessment process. It should be constructive, timely and meaningful. In the present study, close to ninety per cent of students agreed that there is a need to give timely and practical feedback to students. Feedback encourages critical thinking and motivates one to reflect on what needs to be done to improve academic performance. It also guides the teachers to accommodate the learning needs of the students. It should reveal the format of grading to the students. In most medical schools, practical exercises are an integral part of the coursework in pathology hence the assessment of these practical exercises is important. [11]

Conclusion

This study revealed that most of the students found pathology interesting as a course of study with a general preference for integrated teaching methods with a focus on the traditional blackboard teaching method and MCQ, *viva-voce* and practical tests as useful assessment tools. Feedbacks from the students regarding pathology as a subject may help with upgrading and refinement. Therefore, upgrading the medical education system in India will enable students to acquire the requisite knowledge, ethics, communication skills, and help them to become better learners and professionals.

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