



Does the Pathology Education Received in the Undergraduate Preclinical Years Provide Benefits in the Clinical Education Period? A Survey on 5th Grade Medical Students

Temel Tıp Döneminde Alınan Patoloji Eğitimi Klinik Eğitim Döneminde Yarar Sağlıyor mu?
5. Sınıf Tıp Öğrencilerinde Yapılan Bir Anket Çalışması

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ABSTRACT

Aim: We aimed to evaluate the perceptions of 5th grade medical faculty students regarding the adequacy of the pathology education they received in the preclinical period and the benefit of it in clinical clerkship training,

Materials and Methods: A 14-question digital questionnaire consisting of open-ended and multiple choice questions was created and sent via e-mail and whatsapp to the students who were in the 3rd grade at our faculty of medicine in the 2018-2019 academic year and were in the 5th grade in the 2020-2021 academic year. The results were analyzed and statistically evaluated.

Results: 56% of the students found the pathology education they received sufficient. Microscopy and macroscopy training, visiting the pathology laboratory, case-based discussion and self-study of the resources suggested by the instructors had a significant contribution to students' learning ($p<0.05$). The medical education received in the 3rd grade offered a significant benefit during the clinical clerkship period ($p=0.02$). The greatest benefit was obtained from macroscopy education and the students strongly recommended macroscopy and case based learning. According to 75% of the students, the education they received helped to understand the disease mechanism.

Conclusion: The medical pathology education formed the basis of the clinical clerkship period and case-based learning and macroscopy training were the most effective methods. To be more useful, didactic lessons should be combined with different and up-to-date learning methods and the curriculum should be updated. Standardization of pathology education in medical faculties is also an issue that needs to be addressed.

Keywords: Undergraduate medical education, pathology, macroscopy training, case based learning, curriculum

ÖZ

Amaç: Bu anket çalışmasında tıp fakültesi 5. sınıf öğrencilerinin prelinik dönemde aldıkları patoloji eğitiminin yeterliliği ve klinik staj eğitimlerine faydası ile ilgili algılarının ölçülmesi ve değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Açık uçlu ve çoktan seçmeli sorulardan oluşan 14 soruluk bir dijital anket oluşturularak, 2018-2019 eğitim yılında tıp fakültemizde 3. sınıfı okumuş ve 2020-2021 eğitim yılında 5. sınıfta okumakta olan öğrencilere e-mail ve WhatsApp aracılığı ile gönderilmiştir. Sonuçlar incelenmiş ve istatistiksel olarak değerlendirilmiştir.

Bulgular: Öğrencilerin %56'sı 3. sınıfta aldıkları patoloji eğitimini yeterli bulmuştur. Mikroskopi ve makroskopi eğitiminin, patoloji laboratuvarı ziyaretinin, olgu örneği eşliğinde tartışmanın ve eğitmenin gösterdiği kaynakları kendi kendine çalışmalarının öğrencilerin patolojiyi öğrenmelerine anlamlı katkısı saptanmıştır ($p<0,05$). Öğrenciler 3. sınıfta alınan tıp eğitiminin klinik staj döneminde anlamlı yararı olduğunu düşünmektedir ($p=0,02$). En yüksek yararı makroskopi eğitiminden görmüş olup makroskopi ve olgu bazlı öğrenme çalışmaları yapılmasını önermektedirler. Öğrencilerin %73'ü aldıkları eğitimin hastalık mekanizmasını anlamakta yarar sağladığını düşünmektedir.

Sonuç: Fakültemizde alınan tıbbi patoloji eğitiminin klinik staj dönemine temel oluşturduğu ve kliniği öğrenmekte faydalı olduğu görülmüştür. Öğrenciler, olgu bazlı öğrenme ve makroskopi eğitimini en etkili yöntemler olarak görmek ve ağırlık verilmesini önermektedirler. Didaktik derslerin

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daha yararlı olması için farklı ve güncel öğrenme yöntemleri ile kombine edilmesi ve müfredatın güncellenmesi uygun olacaktır. Ülkemizde tıp fakültelerinde patoloji eğitiminin standardizasyonu da üzerinde çalışılması gereken bir konudur.

Anahtar Kelimeler: Tıp eğitimi, patoloji, makroskopi eğitimi, olgu bazlı öğrenme, müfredat

INTRODUCTION

Pathology teaching in medical faculties that run an integrated program aims to enable medical students to gain competence in three basic areas. These are understanding of disease mechanisms, integration of mechanisms into organ system pathology, and application of pathology to diagnostic medicine¹⁻⁴. Traditionally, classroom lectures and laboratory practice training are carried out together in pathology education. In the last 10 years of PubMed, Medline and ULAKBİM literature review, there is no national or international publication that measures the reflection of the pathology education given in the 2nd and 3rd grades to the clinical education years. In this survey-based study, it was aimed to measure and evaluate the perceptions of the 5th grade students of our faculty about the value of pathology and the reflection of the pathology education that they previously received on their clinical (internship-practice) education. It is thought that the results will contribute to the development of pathology education in medical faculties.

MATERIALS AND METHODS

In this study, among the students who had attended the 3rd grade in our medical faculty in the 2018-2019 academic year and who were studying in the 5th grade in the 2020-2021 academic year, those who gave their consent to participate in the survey were included. A 14-item questionnaire, created jointly by the Medical Training and Medical Pathology Departments and prepared with Google Forms, was sent to the students via e-mail or WhatsApp, and they were asked about the reflection of the pathology education they received during their basic education years on their clinical education. The questions were prepared as open-ended (2 questions), multiple-choice with single answer (2 questions), and multiple-choice with answer more than one (2 questions) and with Likert scale (8 questions) method (Figure 1).

This study sought answers to the following questions:

- Which learning methods do the students think contribute and will contribute positively to their success in clinical internships in the 3rd year?
- According to the students, what are the positive aspects of the pathology education given in the 3rd grade and which aspects need to be improved?

Statistical Analysis

The data were analyzed by applying the chi-square test with the SPSS 23.0 statistical software. In the chi-square test, $p < 0.05$ was considered significant.

RESULTS

33 (47.8%) of 69 students attending the 5th grade participated in the study by giving their consent (13 girls/20 boys). The age distribution was between 21 and 27 years, with a mean age of 22.8 years. Six (18.1%) of the students found the education that they received insufficient, 8 (24.2%) partially sufficient, 11 (33.3%) sufficient and 8 (24.2%) very sufficient.

The evaluations of the contribution of the methods used in the pathology education to students' learning are given in Table 1. Students thought that microscopy/macroscope training, pathology laboratory visit, discussion with case examples and self-study methods with the instructor's reference contribute more to their learning.

The students were asked, "How useful do you think the pathology education received in basic medical education is during the clinical education years?" and their answers to the question are shown in Figure 2. According to the results, there is a statistically significant relationship between the total adequacy of the education they received and its clinical usefulness ($p=0.02$). Approximately 68% of the students think that the education received will provide a lot of benefits in the clinic.

To the question "How do you think the pathology education you received in your 2nd and 3rd grades is useful for you in the clinic?", the students answered as "for understanding the disease mechanism" with the highest rate (72.7%, $n=24$). Other responses are shown in Figure 3.

The answers given to the question of what is needed for the pathology education received in the preclinical period to be useful during the clinical education years are given in Table 2. Accordingly, the most recommended education method is case-based learning (63.6%) and autopsy and macroscopic studies (63.6%).

An open-ended question for their other opinions and suggestions was asked to the students and some of the answers are presented in Table 3.

THOUGHTS OF 5TH GRADE STUDENTS ABOUT THE BENEFIT OF PATHOLOGY EDUCATION, GIVEN IN THE BASIC EDUCATION YEARS, ON CLINICAL EDUCATION

1. Your age
2. Your sex
3. How sufficiently do you think you have learnt about pathology taught in the 2nd and 3rd grades?
Insufficiently Partially sufficiently Sufficiently Very sufficiently
- In the following 7 questions, it is asked how much the contributions of methods used in pathology education given in the 2nd and 3rd grades are. Please, mark your opinion for each method.
Least- Little- Moderate- Quite- Highest
4. Instructor's lecture giving with ppt presentations
5. Microscopy education
6. Examination of macroscopic specimens
7. Visit to pathology laboratory
8. Problem solving
9. Discussion with case examples
10. Self-study with educator's references
11. In your opinion, how much is pathology education given in basic medicine education of use in clinical education years?
Very little Little Moderate Quite high Very high
12. In your opinion, how do you use pathology education, which has been taught in 2nd and 3rd years, in clinical practice? (You can choose more than one alternative)
In understanding the mechanism of disease In evaluating patient findings
In differential diagnosis In the decision of treatment
In patient follow-up No opinion I didn't benefit
13. In your opinion, what are needed for the pathology education given in 2nd and 3rd years to be beneficial in clinical education years? (You can choose more than one alternative)
Discussion of cases (Case-based learning) Students' preparing homework and projects
Students' working in teams Students' making presentations
Seminars, panels and conferences Autopsy and macroscopic studies
Microscopy studies Frequent quizzes
Students' problem solving and question preparation Use of web and digital-based education tools
Using e-learning tools
14. Other opinions and suggestions.....

Figure 1. Questionnaire

Table 1. "What is the contribution of the methods used in the pathology education you received in the 2nd and 3rd grades to your learning?"

	The least contribution (%)	Little contribution n (%)	Moderate contribution n (%)	Considerable contribution n (%)	The highest contribution n (%)
Instructor's lecture accompanied by ppt presentation	3 (9.0)	2 (6.0)	6 (18.1)	11 (33.3)	11 (33.3)
Microscopy education	5 (15.1)	1 (3.0)	7 (21.2)	8 (24.2)	12 (36.4)
Examination of macroscopic specimens	1 (3.0)	4 (12.1)	6 (18.1)	5 (15.6)	17 (51.5)
Pathology laboratory visit	3 (9.0)	6 (18.1)	6 (18.1)	9 (27.3)	9 (27.3)
Problem solving	10 (30.3)	4 (12.1)	5 (15.1)	4 (12.1)	10 (30.3)
Discussion with case example	6 (18.1)	3 (9.0)	3 (9.0)	5 (15.2)	16 (48.5)
Self-study with instructor's reference	8 (24.2)	3 (3.0)	6 (18.1)	8 (24.2)	8 (24.2)

n=33, ppt; PowerPoint

DISCUSSION

In our country, medical education includes 3 years of preclinical education, 2 years of clinical education and 1 year of internship. Medical Pathology, which is the branch

of surgical sciences, and Medical Pharmacology, which is the branch of internal sciences, are also taught in the preclinical education years. Medical Pathology education aims to help doctor candidates to understand the pathogenesis of diseases and thus to comprehend diagnosis and treatment more easily.

Each medical school prepares a medical education curriculum according to the National Core Education Program (UCEP) objectives⁴ and determines the pathology topics and course hours. Although the desired goal is the same, it is noteworthy that there is no standardization among medical faculties in our country regarding the classes and course hours in which medical pathology is given⁵. Another difference among

medical faculties is the education methods applied⁵⁻⁷. Medical education cannot be considered as a priority issue because of the fact that the staff providing education in medical faculties are also those who provide routine diagnostic services and research, and it may not be possible to diversify education methods, benefit from modern methods or evaluate the success of education under heavy workload.

Pathology education is given in the 2nd and 3rd grades in our medical faculty. In the second year, introduction to pathology about general pathology, terminology, cell damage and cell adaptation, inflammation and repair are covered, while in the third year, immunology, neoplasia and systems pathology courses are included in the integrated curriculum. In the group included in this study, theoretical lessons were taught with the traditional didactic method, and case examples were discussed during the lessons in order to integrate the pathology subjects with the clinic, and it was aimed to continue the lesson in an interactive manner by placing questions in Powerpoint presentations. However, education methods such as problem-based learning or teamwork were not used. The laboratory application part of the pathology courses was carried out with clinical discussions of case preparations prepared in light microscopy according to the number of students in the 2018-2019 academic year when this study was tested. In our faculty, in addition to microscopy, macroscopy specimens in the pathology museum are discussed. Moreover, visits are made to the pathology laboratory of the advanced training hospital, and the students receive information about the functioning of the pathology clinic from their representatives in each profession and see the process in place.

Up to 70% of the students who participated in the survey in this study stated that they benefited from the pathology training they received to a great extent during their clinical internship. They also stated that they benefited especially in understanding the mechanism of the disease, evaluating the patient's findings, and during differential diagnosis. These data suggest that the pathology education that we give has been successful and has achieved its main goals.

According to the results of our survey, 67% of the students, who thought that the pathology education they received was sufficient for them, benefited greatly from the macroscopic study. Consistently, the majority of students (64%) thought that training in macroscopy and autopsy is needed for pathology education to be useful during the years of clinical education. The benefits of macroscopic education are also emphasized in current publications on pathology education, but also the difficulties of establishing pathology museums are mentioned⁸. Moreover, there are publications on the use of digital techniques⁹, video images, macroscopic specimens created via 3D printing¹⁰, and mobile learning platforms⁸. Studies on

"In your opinion, how much is pathology education given in basic medicine education of use in clinical education years?"

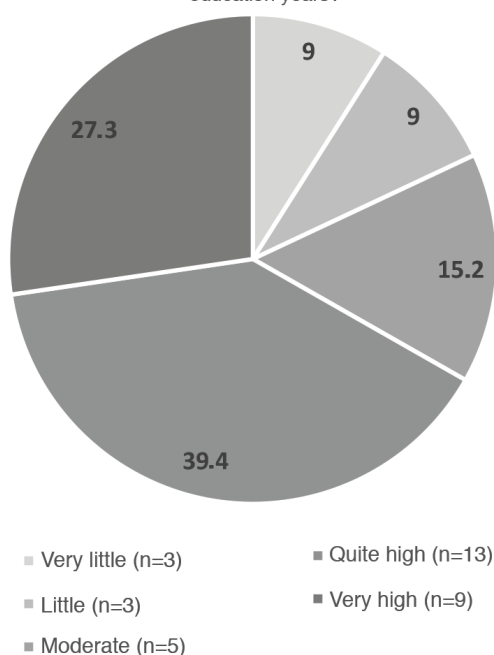


Figure 2. Responses to the question "How useful do you think the pathology education received in basic medical education is during the clinical education years?" (%)

Table 2. "What is needed for the pathology education you receive in the 2nd and 3rd grades to be useful during the clinical education years?"

Recommendations	n (%)
Discussion of cases (case-based learning)	21 (63.6)
Students' preparing homework and projects	12 (36.4)
Students' working in teams	7 (21.2)
Students' making presentations	12 (36.4)
Seminars, panels and conferences	3 (9.1)
Autopsy and macroscopic studies	21 (63.6)
Microscopy studies	14 (42.4)
Frequent quizzes	8 (24.2)
Students' problem solving and question preparation	9 (27.3)
Use of web and digital-based education tools	11 (33.3)
Using e-learning tools	7 (21.2)

education methods in the last 10 years have focused on the importance of autopsy and cadaver in pathology education^{11,12} and all have emphasized that this type of education is of great benefit despite the decreasing number of cadavers/autopsies. In our faculty of medicine, there is a large macroscopic archive of approximately 50 cases containing benign and malignant pathology samples of many organs such as thyroid, stomach, colon, breast, kidney and lung. The students who participated in this study and received the pathology education face to face had the opportunity to closely examine and discuss the specimens suitable for the committees, with their educators. As it is clearly seen in the student evaluations, it would be useful to be able to benefit from this archive, which we could not use during the pandemic period, as soon as possible. We think that the inclusion of autopsy observations in pathology practice trainings for the systemic evaluation of pathologies will also contribute a lot to education. After the pandemic process, we aim to speed up the planning and organization meetings that we started with the Forensic Medicine Institute. Although close observation will contribute more, we believe that autopsy training can also be done with up-to-date technologies and digital solutions.

Studies on which method contributes more to medical students in learning pathology show that educational methods in which students can participate interactively and learn by themselves are more beneficial^{4,13,14}. According to our survey study, our students benefited from the case-based discussion sessions at a high level and reported that it was also useful in clinical internships (both, 64%). The benefit of integrated, case-based and problem-based learning is clearly seen in current medical education^{3,15,16}. Students who have received digital microscopy laboratory education in our medical faculty since 2019 examine the cases together with their clinical, laboratory, radiological and pathological features, prepare in advance, present the cases during the laboratory education and discuss them with their educators. During the clinical internship years of these students, we plan to repeat the survey, which is the subject of this study, and discuss the results again.

The numbers of students who said that they benefited or did not benefit from the didactic education provided by the instructor, which is the most classical and common form of education, accompanied by powerpoint slides are close to each

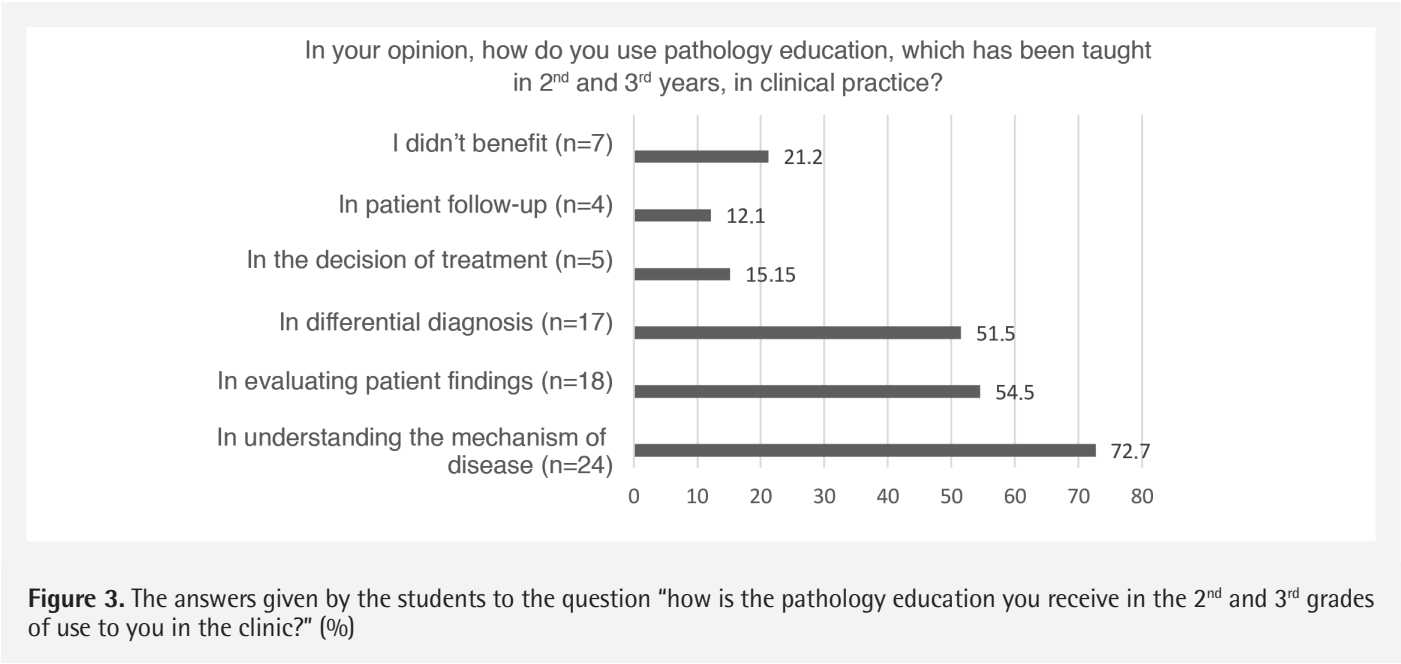


Table 3. "What are your opinions and suggestions about the benefits of pathology education in clinical internships?"
We understand the role of pathology in understanding the disease, knowing its mechanism and planning the treatment for a physician, much better. We would love to receive pathology training again or a short repetition right now.
If the case-based lecture and the pathophysiology of the diseases are well understood, the work becomes a little easier in the clinic. For example, knowing the cardiomyopathies we have learned in cardiology internship from pathology made it easier for us in the oral and theoretical exams.
Carrying out a case-based and question-based education plan in pathology education will help students better understand both diseases and major concepts.
Pathology is one of the fields I mostly got use of in clinical internship. If I understood its pathophysiology, I mastered the diseases better.

other. Some arrangements can be made so that all students can get the maximum benefit from these courses, which require a long and detailed pre-work for the instructor. It is possible to enrich the traditional didactic lessons with various techniques, especially with case and problem-based learning, role-playing and team-based learning, and to make them useful and interesting¹⁷⁻²⁰. Azer found 1061 publications, half of which were conducted in the last 4 years, in the search of Medline/HighWire databases for publications made between 1978 and 2003 with the keywords "good educator" and "mentor"²¹. The researcher stated that this result showed that the awareness about the training, development and monitoring of educators was increasing gradually and added that good educators were also good role models, affected students' career choices and enabled students to reveal their true potential²¹. It should also be considered that this issue should be handled on the basis of administrative approaches and planning, and that pathology specialists who choose to be educators should be evaluated in a different status.

The theoretical load of medical education is heavy in the 2nd and 3rd years of medical education, and pathology courses cover a wide area of the preclinical curriculum. The heavy curriculum makes it difficult to diversify education methods and reach students who learn in different ways. In this respect, it may also be beneficial to review the pathology curriculum together with the Department of Medical Education in line with the goals of UCEP. Moreover, methods such as flipped classroom, working in groups, peer education, and student presentation can reduce the number of didactic lessons. It would be appropriate for the educator to gradually turn from lecturer to a guide and facilitator²².

There are also studies that mention the importance of an accelerated repetition of pathology during the internship period²³⁻²⁵. In these publications, it is stated that a rapid repetition of pathology-specific medical knowledge, basic skills and processes in anatomical pathology and laboratory medicine in the last year of medical school will be beneficial, and it is also thought that it will increase the orientation to pathology specialization. This issue can also be reviewed with the Department of Medical Education and also discussed on a national scale for curriculum standardization.

As Hortsh says in his article, "listening to the student will have its own rewards"²⁶. We believe in the importance of student feedback in the development of learning materials and educational strategies and in order for the educator to be more effective. We think that a two-way, effective educator-student communication will make it easier for us to reach the educational goal we want to achieve. Therefore, we believe that such survey studies will contribute to the quality of education.

Study Limitations

One of the limitations of our survey study was the low participation in the survey (48%, 33 students). However, it was determined that the group had diversity suitable for the analysis. Another limitation is that the sample group consisted of students of our relatively young faculty, who were given pathology training for the first time. After the class chosen as an example for this survey study, Digital Microscopy education was started in the pathology laboratories in the 3rd grades in the 2019-2020 academic year. The next academic year (2020-2021), on the other hand, was conducted completely synchronously online due to the global pandemic. Despite the difficulties of the pandemic conditions, education has been tried to be diversified and updated even more with methods such as case-based education, teamwork, peer education, addition of digital opportunities, and panels in each new student group. It would be appropriate to learn the thoughts and evaluations of these student groups with a new questionnaire when they reach the 5th grade and to discuss them by comparing with the current results.

CONCLUSION

In summary, in this survey study, it was aimed to obtain data that would benefit education planning by asking 5th grade medical students how much and how they benefited from the pathology education they received in the 3rd grade during their clinical internships. According to the findings, the medical pathology education formed the basis of the clinical internship period and was useful in learning the clinic. We found that the two most effective methods on this subject in this group of students who received medical pathology training during the face-to-face education period were case-based discussion and macroscopy education. It is considered appropriate to combine didactic courses with different and up-to-date learning methods and to review the curriculum with the Department of Medical Education in order to be more useful. In our country, discussion and standardization of pathology education in medical faculties are among the subjects that need to be studied.

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Ethics

Ethics Committee Approval: The study was approved by the Human Research Ethics Committee of IstinYE University (protocol no: 87, date: 15.09.2020).

Informed Consent: Informed consent is taken from all participants.

Peer-review: This survey study is externally peer reviewed.

Authorship Contributions

Practices: S.Ş., S.K., Y.S.G., N.E., Concept: S.Ş., S.K., Y.S.G., Design: S.Ş., S.K., Y.S.G., H.K., N.T.F., Data Collection or Processing: S.Ş., S.K., Y.S.G., Analysis or Interpretation: S.Ş., S.K., Y.S.G., H.K., N.T.F., Literature Search: S.Ş., S.K., Writing: S.Ş., S.K., Y.S.G., H.K., N.T.F.

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