

Medical students' views on the distance education practices of the neuroanatomy course during the pandemic

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Ethics Committee Approval

The ethical approval was given by the Hamidiye Scientific Research Ethics Committee (21/185). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest

No conflict of interest was declared by the authors.

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Abstract

Background/Aim: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in late 2019. This highly contagious and pathogenic coronavirus causes acute respiratory disease pandemic coronavirus disease 2019 (COVID-19). More than 1.2 billion students in 186 countries are currently affected by school closures due to the COVID-19 pandemic. Educational activities, including clinical medical education, were also stopped during the pandemic. To maintain the continuity of medical education, distance learning approaches were developed, including online/offline teaching methods. Within the scope of this training, the effect of distance learning on students' experience of neuroanatomy teaching was investigated.

Methods: The study sample included 61 students who agreed to participate. The data of the students who accepted to participate in the study were obtained via a questionnaire form created using the "Attitude Scale towards Distance Education". The questionnaire was uploaded to the forms section of the Microsoft Teams program, and the link address was sent to all students who took the Neuroanatomy course from the International Faculty of Medicine 2nd year students via e-mail.

Results: Most students (n = 44, [72.1%]) stated that they could access the internet without any problems, while others had problems. Some students (n = 10; 83.6%) had to share their remote connection devices with their family members during distance education. Some students (n = 9, [14.8%]) had to use mobile phones for homework and exams. Less than half of the students (n = 27, [44.3%]) responded that 3 h per week neuroanatomy teaching was sufficient; most (n = 34, [55.7%]) responded that this was insufficient ($P < 0.01$). Many of the students who took the distance learning neuroanatomy course (n = 27, [44.3%]) believe that the course has contributed to their professional development ($P < 0.01$). During distance education, active participation of the classmates – by turning on their microphones – increased the students' motivation (n = 53, [88.3%]).

Conclusion There were difficulties in understanding the neuroanatomy lectures delivered by distance education. The Turkish students had greater problems in understanding relative to the international students, who were much more focused. Students will likely derive greater benefit from doing the neuroanatomy course face to face.

Keywords: Attitude scale, Anatomy, COVID-19, Pandemic

Introduction

Widespread changes have occurred in our society, accompanying the global response to the coronavirus disease 2019 (COVID-19) outbreak [1]. Schools and universities in Turkey have been closed to encourage social distance. The impact of this change on medical education has been immense. The effect of basic medical sciences education in the first 3 years of medical school on students who will become physicians is essential in terms of patient knowledge [2]. On the other hand, anatomy education has been separated from laboratory conditions due to the transfer of teaching activities to the online environment [3]. Currently, there is disappointment among medical students transitioning to a complete distance education paradigm.

Neuroanatomy is a challenging sub-anatomy subject for medical students, addressing the complex structures of the three-dimensional relationships of the neuronal system and difficult clinical integration [4]. In the absence of contact teaching, such as dissection room sessions, and the removal of extrinsic motivations such as exams, it is easy to see how undergraduate neuroanatomy training was particularly vulnerable during the COVID-19 pandemic.

To minimize the negative impact, it is necessary to provide neuroanatomy resources that are easily accessible, support an inner interest, and are supported by appropriate pedagogy to positively impact knowledge [5]. Students may continue to work independently during long periods of isolation with high-inner interest.

Online learning platforms are currently used by universities to support the learning of students in neuroanatomy and to expand free educational resources [6]. Online platforms now have a wide variety of functions. This way, lecture-discussion rooms are created for small group discussions by organizing online lectures. Interactive materials, such as quizzes or patient-based case studies, are also used. Alternatively, student information is supported by pre-recorded content such as screen video recordings by organizing mini-courses.

Online learning provides medical students the flexibility and option to carry out self-learning at home at convenient times [7]. This also allows medical students to control their time on a subject. Thus, the students prevent information overload and allow them to allocate more time to the areas they struggle with. To minimize the cognitive load, it is important that the instructional design of screen video recordings is in line with the principles of the cognitive theory of multimedia learning. Cognitive load is placed on studying memory while processing information for learning and is particularly important in an information-rich subject, such as neuroanatomy [5]. Therefore, it is crucial to consider online resources to be effective in increasing knowledge acquisition and maintaining student engagement. Along with the participation of the students in the course process, their opinions also play a key role in improving the lecture [8].

In this study, the views of Turkish and international students in our faculty about the distance education of the neuroanatomy course were evaluated. The results will contribute

to efforts to improve the functioning of challenging lessons, such as neuroanatomy.

Materials and methods

Research type

Here we investigate the attitudes of medical students studying at the University of Health Sciences, International Faculty of Medicine, towards distance education in neuroanatomy lectures. Ethical approval was obtained from the Hamidiye Scientific Research Ethics Committee, the scientific ethics committee of the university (accepted in 2021 and numbered as 21/185).

Research universe and sample

The study universe consisted of the University of Health Sciences, Faculty of International Medicine, and Turkish and International students studying in semester 2. The study sample included 91 students who agreed to participate in this study. These students were 76 (83.5%) women and 15 (16.5%) men. Eighty-one students (89.0%) were Turkish Republic citizens, and ten (11.0%) were international students.

Data collection type

The data of the students who accepted to participate in the study were obtained with a questionnaire form created using the "Attitude Scale towards Distance Education". This questionnaire form was prepared, the gender of the student and how it provides communication with the lecturers. Communication options included "I can communicate by phone", "text message", "email when I need it" and "teachers are unavailable". In neuroanatomy education, the online follow-up level of all courses and the device elements were questioned by combining the distance education method during the pandemic process. In addition, students' views on the efficiency of theoretical courses and their attitudes towards distance education were also asked."

Attitude Scale towards Distance Education

The "Attitude Scale towards Distance Education" developed by Agir et al. [9] has two sub-dimensions and consists of 21 items. It was developed as a 5-point Likert scale: (1) (strongly disagree) to (5) (strongly agree). The measurement tool contains seven negative items (11, 12, 13, 14, 15, 17, 19) whose values should be reversed in data analysis. The lowest score that can be obtained from the scale is 21, while the highest score is 105 [9].

Online data collection

Informed consent was obtained from the students. The students' names remained confidential. The questionnaire was uploaded to the forms section of the Microsoft Teams program, and the link address was sent to all students who took the Neuroanatomy course from the International Faculty of Medicine 2nd year students via e-mail.

Statistical analysis

The distribution of the students' responses participating in the study was analyzed with the number and percentage in the SPSS 22.0 package program. The students' answers differed according to their demographic information and were analyzed using the Chi-square test. Statistical techniques, such as percentage, frequency, t-test, and One-Way Analysis of Variance (ANOVA), were used to analyze the sub-problems. In addition,

the correlation of the scale with the 17 questions added was examined with the Pearson test. $P < 0.05$ was considered significant.

Results

Student attendance

Sixty-one students (38 female [62.3%]) participated in the survey study. Most (75.4%) were international students ($n = 46$, 24.6%) and 15 were Turkish Republic citizens. Responding to the question about what device was used for distance education, 54 (88.5%) answered that they connected using a computer and seven (11.5%) connected with a tablet.

The question asked whether there was a problem with free access to the internet in the place where students live. Students ($n = 44$, [72.1%]) stated that they could access the internet without any problems, while others ($n = 44$, [72.1%]) had problems. Some students ($n = 10$, [83.6%]) had to share their remote connection devices with their family members during the distance education process. Some students ($n = 9$, [14.8%]) had to use mobile phones for homework and exams. Most students ($n = 34$, [55.7%]) responded that the 3 h per week of neuroanatomy lessons was insufficient.

To the question that sharing the lecture videos beforehand had a positive effect on learning the neuroanatomy lesson, students ($n = 44$, [72.1%]) answered that this situation had a positive effect. Many of the students who took the distance learning and neuroanatomy course ($n = 27$, [44.3%]) responded that they believe this contributed to their profession ($P < 0.01$).

Students ($n = 37$, [60.7%]) stated that actively participating in the neuroanatomy lecture by turning on the microphone during the lesson contributed to the course's learning. In distance education, the fact that the instructor's camera was constantly on during the lesson increased students' interest ($n = 55$, [90.2%]). During distance education, active participation of the classmates by turning on the microphone increased students' motivation ($n = 53$, [88.3%]).

It has been observed that international students find distance education more effective than Turkish students ($P < 0.01$). Also, attending lessons from abroad find distance education more effective than in Turkey ($P < 0.01$). All the obtained findings were classified and displayed in the description table (Table 1). Information about the neuroanatomy course is shown in Table 2. Descriptive statistical analysis of the students was classified in Table 3.

Table 1: Description of student conditions

	f	%
<u>Gender</u>		
Woman	38	62.3
Male	23	37.7
<u>Nationality</u>		
Turkish	15	24.6
International	46	75.4
<u>Device</u>		
Computer	54	88.5
Tablet	7	11.5
<u>Attendance</u>		
Turkey	46	75.4
Abroad	15	24.6
<u>I have constant and smooth access to the internet.</u>		
No	17	27.9
Yes	44	72.1
<u>During distance education, I must share my device with family/home members.</u>		
No	51	83.6
Yes	10	16.4
<u>I must use my cell phone for homework and exams.</u>		
No	52	85.2
Yes	9	14.8

Table 2: Condition of neuroanatomy lectures

<u>Hours of the neuroanatomy lesson were sufficient for distance education from the pandemic process.</u>		
	f	%
No	34	55.7
Yes	27	44.3
<u>Sharing the theoretical and laboratory lecture videos beforehand had a positive effect on learning neuroanatomy</u>		
No	17	27.9
Yes	44	72.1
<u>I think learning neuroanatomy with distance education methods will contribute to my profession.</u>		
No	34	55.7
Yes	27	44.3
<u>I could repeat the lecture notes the same day after the lesson topic was taught.</u>		
No	41	67.2
Yes	20	32.8
<u>I could answer the questions the lecturer asked during the neuroanatomy distance education course.</u>		
No	21	34.4
Yes	40	65.6
<u>Being active in the lesson by turning on my microphone during the lesson contributed to my learning about neuroanatomy.</u>		
No	24	39.3
Yes	37	60.7
<u>The fact that the instructor's camera was always on during the lesson increased my interest in the lesson</u>		
No	6	9.8
Yes	55	90.2
<u>Active participation of my classmates in the class by turning on their microphones during the lesson increased my motivation.</u>		
No	7	11.7
Yes	53	88.3

Table 3: Descriptive statistical analysis of the students, * $P < 0.05$

	Mean (SD)		P-value
Woman	68.89 (16.08)		0.428
Male	72.26 (5.77)		
Turkish	61.07 (17.16)		0.010*
International	73.13 (14.48)		
Computer	70.19 (15.89)		0.977
Tablet	70 (17.45)		
Turkey	66.43 (15.29)		0.001*
Abroad	81.6 (12.20)		
I have constant and smooth access to the internet.			
No	68.29 (18.20)		0.573
Yes	70.89 (15.11)		
During distance education, I must share my device with family/home members.			
No	72.53 (14.47)		0.008*
Yes	58.1 (18.24)		
I must use my cell phone for homework and exams.			
No	71.04 (14.53)		0.306
Yes	65.11 (22.84)		
Hours of the neuroanatomy lesson were sufficient for distance education from the pandemic process.			
No	64.88 (14.89)		0.003*
Yes	76.81 (14.87)		
Sharing the theoretical and laboratory lecture videos beforehand had a positive effect on my learning neuroanatomy			
No	63.94 (17.71)		0.057
Yes	72.57 (14.68)		
I think learning neuroanatomy with distance education methods will contribute to my profession.			
No	62.59 (14.83)		<0.001*
Yes	79.70 (11.67)		
I could repeat the lecture notes the same day after the lesson topic was taught.			
No	68.83 (15.99)	-0.937	0.353
Yes	72.9 (15.83)		
I could answer the questions the lecturer asked during the neuroanatomy distance education course.			
No	65.81 (15.83)	-1.567	0.123
Yes	72.45 (15.68)		
Being active in the lesson by turning on my microphone during the lesson contributed to my learning about neuroanatomy.			
No	71.88 (18.83)	0.673	0.504
Yes	69.05 (13.88)		

SD: standard deviation

Discussion

There are several ways in which online learning can be structured and implemented. The online platform can be designed as a complete reconstruction of the curriculum or in addition to other envisaged activities. A complete online curriculum provides structured learning and allows students to measure progress and set goals, an important element of intrinsic motivation [10]. The downside of recreating online activities for a whole curriculum value is taking time and planning that is not covered by this emergency.

Methods of promoting inner interest through online platforms include case studies and gamification. Patient-based case studies motivate learning by reminding the student of the value and interest that learning neuroanatomy has in future careers [5]. Online learning approaches, although structured, can be a versatile way to engage medical students in their learning. The role of the educator is to consult with the relevant pedagogy to ensure that online learning tools are well equipped to provide students with a clear learning path throughout the curriculum [11].

Although online teaching and learning have been practiced for years, the effects were unsatisfactory. Teachers refused to use unconventional online teaching tools. The data investigated the factors affecting student motivation in online teaching tools [12]. Motivating teachers to change their teaching approach or style is one of the biggest obstacles. The research examined successful online teaching practices and found that teachers' "themselves" and their participant roles in the online environment were essential [13].

On the other hand, many students were not used to using online learning platforms to study. Studies have reviewed practices for providing effective online teaching and learning to students. Technology and communication competencies are key factors that increase student satisfaction and retention, but motivation and availability in online learning are key issues for student engagement [14, 15]. Practical scenarios, video lectures, self-assessment activities, and exercises to integrate theory and practice, including learning activities, were recommended to educators to improve the online learning presence of the students [16, 17].

Despite the difficulties associated with distance education, the students stated that the neuroanatomy course hours were sufficient. In addition, they believe that learning neuroanatomy, even from a distance, will have a positive effect at the time of specialization. Finally, another challenge is that students have to share their educational tools with households throughout the entire distance education process. This situation may cause them to delay the lessons.

Understandably, concerns arise when only online teaching is used. However, it has been shown that students with a blended learning experience combining online and face-to-face teaching have better knowledge [18].

Educators and students navigated new education systems and adapted existing teaching and learning methods to the evolving educational environment. Balancing home and work may now have minimal physical segregation and include childcare for some. With additional clinical responsibilities, educators may have limited time to create content and could sometimes complete the transformation of courses from face-to-face training to fully virtual experiences. Course managers may encounter educators unfamiliar with newly applied technologies in medical education [19].

In response to the coronavirus epidemic, distance learning was one of the solutions for the education sector. Higher education institutions around the world reviewed the feasibility of online learning to minimize its impact on students' academic progress while face-to-face lectures were suspended.

The immediate impact of the COVID-19 outbreak on burnout, work engagement, and surgical training in the Netherlands was measured. This study demonstrated a significant impact of the first months of the COVID-19 outbreak on the Dutch surgical trainee program, with a significant reduction in surgical exposure and training [20]. This study emphasized the need for adequate guidance for all surgical residents and the potential extension of the surgical training program.

Changes in institutions were the transition to formative end-of-year exams regardless of achievement. Researchers have hosted the Soton-BrainHub website with social media accounts. This included animated videos about neuroanatomy, head and neck anatomy, cranial nerve examination videos, and recorded lectures. The Soton-BrainHub YouTube channel received 69,000 views in April 2020, a 61% increase over the monthly average in 2019 [5]. This was an example of the growing demand for online licensing neuroanatomy resources.

Documents detailed an approach to redesigning the clinical learning system, which includes a description of the learners and the environment, the pedagogical principles guiding the approach, and the technological tools used in practice. In addition, the available literature on this topic was researched, and an assessment of the work to date was presented [21]. Recommendations for future guidelines for postgraduate medical education online have been presented.

Limitation

The low number of participants in this study is a limitation but was unavoidable due to the pandemic. The large number of students attending the course allowed us to analyze only this number. This study could be repeated on a larger scale. In future research, we will conduct face-to-face lectures and compare students' perceptions relative to those using distance learning. Afterward, an assessment may be required for other anatomy courses, both face-to-face and online. Cooperating with different universities and increasing the number of samples is necessary.

Conclusion

In conclusion, it was found that there were difficulties in understanding neuroanatomy lectures with distance education. It was determined that Turkish students had greater problems in understanding while international students were much more resilient. Conducting the neuroanatomy course face to face will support a better understanding of the systems, especially from a clinical point of view.

References

- Nicomedes CJC, Avila RMA. An analysis on the panic during COVID-19 pandemic through an online form. *J Affect Disord.* 2020;276:14-22. doi: 10.1016/j.jad.2020.06.046. Cited in: Pubmed; PMID 32697692.
- Cardinal L, Kaell A. The role of medical education in the development of the scientific practice of medicine. *J Community Hosp Intern Med Perspect.* 2017;7(1):58-60. doi:10.1080/20009666.2017.1286815. Cited in: Pubmed; PMID 28634530.
- Franchi T. The impact of the Covid-19 pandemic on current anatomy education and future careers: A student's perspective. *Anatomical Sciences Education.* 2020;13(3):312-5.
- Estevez ME, Lindgren KA, Bergethon PR. A novel three-dimensional tool for teaching human neuroanatomy. *Anat Sci Educ.* 2010 Nov-Dec;3(6):309-17. doi: 10.1002/ase.186. Cited in: Pubmed; PMID 20939033.
- Hall S, Border S. Online Neuroanatomy Education and Its Role During the Coronavirus Disease 2019 (COVID-19) Lockdown. *World Neurosurg.* 2020;139:628. doi: 10.1016/j.wneu.2020.05.001. Cited in: Pubmed; PMID 32426071.
- Elmansouri A, Murray O, Hall S, Border S. TEL Methods Used for the Learning of Clinical Neuroanatomy. *Advances in experimental medicine and biology.* 2020;1260:43-73. doi: 10.1007/978-3-030-47483-6_4. Cited in: Pubmed; PMID 33211307.
- Baczek M, Zaganczyk-Baczek M, Szpringer M, Jaroszynski A, Wozakowska-Kaplon B. Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students. 2021;100(7):e24821. doi: 10.1097/md.00000000000024821. Cited in: Pubmed; PMID 00005792-202102190-00087.

8. Revell A, Wainwright E. What Makes Lectures 'Unmissable'? Insights into Teaching Excellence and Active Learning. *Journal of Geography in Higher Education*. 2009;33(2):209-23. doi: 10.1080/03098260802276771.
9. Ağır F. Uzaktan Eğitime Karşı Tutum Ölçeği Geliştirmeye Yönelik Geçerlilik Ve Güvenirlilik Çalışması. *Education Sciences*. 2007;3(2):128-39.
10. Pelikan ER, Lüftenegger M, Holzer J, Korlat S, Spiel C, Schober B. Learning during COVID-19: the role of self-regulated learning, motivation, and procrastination for perceived competence. *Zeitschrift für Erziehungswissenschaft*. 2021;24(2):393-418. doi: 10.1007/s11618-021-01002-x.
11. Rapanta C, Botturi L, Goodyear P, Guàrdia L, Koole M. Online University Teaching During and After the Covid-19 Crisis: Refocusing Teacher Presence and Learning Activity. *Postdigital Science and Education*. 2020;2(3):923-45. doi: 10.1007/s42438-020-00155-y.
12. Mohamad SNM, Salleh MAM, Salam S. Factors affecting lecturers motivation in using online teaching tools. *Procedia-Social Behavioral Sciences*. 2015;195:1778-4.
13. Baran E. The transformation of online teaching practice: Tracing successful online teaching in higher education. *Graduate Theses and Dissertations*. 2011; Paper 12206..
14. Law KMY, Geng S, Li T. Student enrollment, motivation and learning performance in a blended learning environment: The mediating effects of social, teaching, and cognitive presence. *Computers & Education*. 2019;136:1-12.
15. Widjaja AE, Chen JV. Online Learners' Motivation in Online Learning: The Effect of Online-Participation, Social Presence, and Collaboration. *Learn Technol Educ Issues Trends*. 2017:72-93.
16. Janse van Rensburg ES. Effective online teaching and learning practices for undergraduate health sciences students: An integrative review. *International Journal of Africa Nursing Sciences*. 2018;9:73-80.
17. Rohrbach S, Werner N, Ishizaki S, Miller J. Designing an engaging digital learning tool: A report on a motivation study and its impact on the design of an online learning tool. 2014 IEEE International Professional Communication Conference (IPCC); 2014;1-5 p.
18. Vallée A, Blacher J, Cariou A, Sorbets E. Blended Learning Compared to Traditional Learning in Medical Education: Systematic Review and Meta-Analysis. *Journal of medical Internet research*. 2020 Aug 10;22(8):e16504. doi: 10.2196/16504. Cited in: Pubmed; PMID 32773378.
19. Newman NA, Lattouf OM. Coalition for medical education—A call to action: A proposition to adapt clinical medical education to meet the needs of students and other healthcare learners during COVID-19. *Wiley Online Library*; 2020.
20. Poelmann FB, Koëter T, Steinkamp PJ, Vriens MR, Verhoeven B, Kruijff S. The immediate impact of the coronavirus disease 2019 (COVID-19) pandemic on burn-out, work-engagement, and surgical training in the Netherlands. *Surgery*. 2021 Epub 2021/04/07. doi: 10.1016/j.surg.2021.02.061. Cited in: Pubmed; PMID 33820653.
21. Teele SA, Sindelar A, Brown D, Kane DA, Thatte N, Williams RJ, Gueverra J, Wolbrink TA. Online education in a hurry: Delivering pediatric graduate medical education during COVID-19. *Progress in Pediatric Cardiology*. 2021;60:101320.

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