



ORIGINAL ARTICLE

The viewpoint of Medical Students on the Importance of Clinical Anatomy Education

تقييم أهمية التشريح في الممارسة السريرية والطرق الفعالة لتعلمه من وجهات نظر طلاب الطب الداخلي بجامعة مشهد للعلوم الطبية

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Background: Anatomy is one of the most important and basic medical science courses in basic sciences. The aim of this study was to evaluate the importance of anatomy in clinical practice from the viewpoint of intern and extern medical students in Mashhad University of Medical Sciences.

Methods: A descriptive study was performed in the year 2017-2018 in which 238 medical students (clerkship and internship) were selected by census sampling method in Mashhad University of Medical Sciences. The instrument which its validity and reliability were confirmed in the present study was a three-part questionnaire. Data were analyzed using SPSS 16 software and T-test (ANOVA, Chi-Square).

Results: The mean and standard deviation of students' viewpoint of anatomy showed the specialized skills required (1.80 ± 1.37), clinical importance of anatomy course (1.47 ± 1.42), and importance of anatomy course in medical field (1.42 ± 1.29), that were not significant ($p > 0.05$). The mean and standard deviation of male and female students' viewpoint on the method of teaching of anatomy course from the viewpoint of male and female students were: reviewing the theoretical subjects in practical classes (1.43 ± 0.72) and (1.66 ± 0.58), sincere approach and decorated appearance of the professor ($1/56 \pm 0.72$) and ($1/161 \pm 0.60$), simultaneous teaching of clinical and applied materials along with theoretical subjects ($1/05 \pm 0.57$) and ($1/26 \pm 0.57$), and using the body mass and mass (1 ± 0.52) and ($1/21 \pm 0.53$), which showed a significant difference ($p < 0.05$).

Conclusion: Planning for better trainings in anatomy courses and application of anatomical information to medical students in internships and staggers is necessary to improve students' specialized skills.

Keywords: Anatomy Education; Medical Students; Clinical Application

بررسی اهمیت کاربرد آناتومی در بالین و روش‌های مؤثر بر یادگیری درس آناتومی از دیدگاه دانشجویان پزشکی مقاطع استازری و اینترنتی دانشگاه علوم پزشکی مشهد

زمینه و هدف: واحد درسی علوم تشریح یکی از مهمترین و اساسی ترین واحدهای درسی آموزش پزشکی در مقطع علوم پایه است. لذا این مطالعه با هدف تعیین اهمیت کاربرد آناتومی در بالین و روش‌های مؤثر بر یادگیری دروس آناتومی از دیدگاه دانشجویان پزشکی دانشگاه علوم پزشکی مشهد انجام شد.

روش: مطالعه ای توصیفی بر روی ۲۳۸ نفر از دانشجویان پزشکی (استاز و اینترنت) در دانشگاه علوم پزشکی مشهد در سال ۱۳۹۶-۹۷ به روش سرشماری انجام شد. ابزار اطلاعات، پرسشنامه ای سه قسمتی بود که پس از تأیید روایی و پایایی استفاده شد. آنالیز داده‌ها با نرم افزار SPSS ورژن ۱۶ و آزمون های (ANOVA, Chi-Square, T-test) انجام شد.

یافته‌ها: میانگین و انحراف معیار نظرات دانشجویان در هدف از مطالعه آناتومی برای بهبود مهارت های تخصصی مورد نیاز ($1/80 \pm 1/37$)، اهمیت بالینی دروس آناتومی ($1/47 \pm 1/42$) و اهمیت دروس آناتومی در رشته پزشکی ($1/42 \pm 1/29$) بود. اختلاف معنی داری بین نظرات آنها وجود نداشت ($p > 0.05$). شیوه تدریس درس آناتومی از نظر دانشجویان پسر و دختر به ترتیب میانگین و انحراف معیار، مرور مباحث نظری در کلاسهای عملی ($1/43 \pm 0/72$) و ($1/66 \pm 0/58$)، برخورد صمیمانه و ظاهر آراسته استاد ($1/56 \pm 0/72$) و ($1/161 \pm 0/60$)، تدریس همزمان مطالب بالینی و کاربردی در کنار مباحث نظری ($1/05 \pm 0/57$) و ($1/26 \pm 0/57$)، استفاده از مولاژ و جسد ($1 \pm 0/52$) و ($1/21 \pm 0/53$) بود که اختلاف معنی داری وجود داشت ($p < 0.05$).

نتیجه گیری: برنامه ریزی مناسب جهت آموزش بهتر دروس آناتومی و کاربردی نمودن اطلاعات آناتومیک دانشجویان پزشکی در مقاطع استازری و اینترنتی برای بهبود مهارتهای تخصصی دانشجویان لازم و ضروری به نظر می رسد.

واژه های کلیدی: آموزش آناتومی، دانشجویان پزشکی، کاربرد بالینی

الخلفية والهدف: علم التشريح هو واحد من أهم دورات التعليم الطبي في المقطع التعليميه البنائيه والأساسية من العلوم الطبيه. كان الهدف من هذه الدراسة هو تحديد أهمية التشريح في الممارسة السريرية والأساليب الفعالة لتعلم دوره التشريح من وجهة نظر طلاب الطب في جامعة مشهد للعلوم الطبية.

الطريقة: تمت دراسة وصفية عن ۲۳۸ من طلاب الطب في المقطع السريري في الجامعة في ۱۹۹۷-۱۹۹۶ هـ ش بواسطة طريقة التعداد. جمع البيانات باستخدام استطلاع ذي ثلاثة أجزاء بعد اثباته من حيث الصحة والموثوقية و كان إجراء تحليل البيانات باستخدام برنامج SPSS 16 واختبار ANOVA Chi-Square.

النتائج: كان المتوسط والانحراف المعياري لآراء الطلاب حول هدف دراسة التشريح لتحسين المهارات المتخصصة المطلوبة هو ($1/80 \pm 1/37$)، والأهمية السريرية لدورات علم التشريح ($1/47 \pm 1/42$)، وأهمية دورات التشريح في التعليم الطبي كان ($1/42 \pm 1/29$)، كما لم يكن هناك فرق كبير و ذو معنى بين آرائهم ($P > 0.05$). كان الانحراف الوسطي والمعيارى لوجهة نظر الطلاب والطالبات حول طريقة تدریس مقرر التشريح من وجهة نظر الطلاب والطالبات كمايلي: استعراض المواد النظرية في الفصول العملية ($1/43 \pm 0/72$) و ($1/66 \pm 0/58$)؛ المنهج الصادق والمظهر المزين للأساتذ ($1/56 \pm 0/72$) و ($1/161 \pm 0/60$)، التدریس المتزامن للمواد السريرية والتطبيقية إلى جانب المواضيع النظرية ($1/05 \pm 0/57$) و ($1/26 \pm 0/57$)، واستخدام البحث و النماذج ($1 \pm 0/52$) و ($1/21 \pm 0/53$) مما يدل على وجود اختلاف كبير و ذو معنى ($P < 0.05$)

خاتمة: يبدو أن التخطيط المناسب لتدريب أفضل في دورات التشريح وتطبيق المعلومات التشريحية لطلاب الطب في التدريب الداخلي ضروري لتحسينهم في المهارات الطبيه.

الكلمات المفتاحية: تعليم التشريح، طلاب الطب، التطبيق السريري

فارغ التحصيل اور انٹرن ڈاکٹروں کی نظر سے کلینیکل پریکٹس میں ایناتومی (علم تشریح) کی اہمیت اور اس موضوع کا علم حاصل کرنے کے مؤثر طریقے کا جائزہ

بیک گراؤنڈ: بنیادی میڈیکل سائنسس میں ایناتومی کو نہایت اہمیت حاصل ہے لہذا یہ تحقیق کلینیکل لیول پر ایناتومی کی اہمیت کو پیش نظر رکھ کر انجام دی گئی ہے، اس تحقیق میں میڈیکل طباء کی نظر سے ایناتومی کی اہمیت اور اس کا علم حاصل کرنے کے مؤثر طریقوں کے بارے میں رائے لی گئی ہے۔

روش: اس تحقیق میں دوسواڑتیس طباء نے شرکت کی۔ ان طباء کا تعلق مشہد یونیورسٹی آف میڈیکل سائنسس سے تھا۔ ہر طالب علم کو ایک سوالنامہ دیا گیا، ڈیٹا کا تجزیہ ایس پی ایس ایس سولہ، جی اسپکٹرو، ٹی ٹسٹ اور اینووا ٹسٹ کے ذریعے کیا گیا۔

نتیجے: ضروری مہارت حاصل کرنے کے لئے ایناتومی کی تعلیم حاصل کرنے، کلینیکل سطح پر ایناتومی کی اہمیت نیز میڈیکل تعلیم میں ایناتومی کی بنیادی اہمیت میں کوئی خاص فرق نہیں دیکھا گیا۔ طلبہ و طالبات کی نظر میں تدریس کی روش، عملی کلاسوں میں اسباق کا دوہرانا، استاد کا خندہ پیشانی سے پیش آنے اور صفائی ستھرائی، مردے کے جسم پر پریکٹیکل کام کرنا جیسے امور کو حاصل شدہ نمبروں میں خاصہ فرق دیکھا گیا۔

سفارش: اس تحقیق سے لگتا ہے کہ میڈیکل انٹرنز اور اسپیجرز کو مختلف مرحلوں میں ایناتومی کی مفید اور مطلوبہ تعلیم دی جانی چاہیے تا کہ وہ مریضوں کا علاج کرنے کے لئے ضروری مہارتیں حاصل کرسکیں۔

کلیدی الفاظ: ایناتومی، کلینیکل پریکٹس، میڈیکل طالب علم

INTRODUCTION

Human anatomy studies the structures of the human body at the levels of macro anatomy, microanatomy, and evolutionary anatomy (1). Anatomy education is considered an important, fundamental and integral part for medical students throughout the world (2). As soon as students begin their medical education, they must take anatomy courses including Gross Anatomy, Histology, and Embryology. These courses form a major part of basic medical science courses (1, 3). Experts of the clinical sciences consider the knowledge of anatomy as one of the requirements for safe and effective clinical practice in medical interventions (4, 5). Therefore, learning anatomy courses in a practical and clinical approach seems to be necessary to reduce medical errors in medical students. On the other hand, students' awareness of the importance and clinical applications of anatomy can help them to develop their specialized skills (6). Anatomy is a necessity for general medical courses and surgical specialties, and generally for anyone involved in aggressive treatment and diagnostic procedures. Awareness of body structures and the position of vital organs in emergencies are also essential, since many emergency and resuscitation procedures including cricothyroidotomy, chest tube, tracheal tube placement, and many diagnostic procedures and therapeutic principles are based on anatomy (7). Although the first topics medical students are faced with are related to anatomy, for most medical students anatomy is an association of corpse and inanimate bones. Therefore, most of them do not have a positive attitude towards anatomy courses (8). In Iran, after completing a basic science course and completing the National Medical Basic Science Exam, most of which are anatomy courses, medical students enter the physiopathology course and then enter the hospital wards, where they learn physical examinations, diseases, signs and symptoms of the diseases. Therefore, proper and practical learning of basic science courses such as anatomy courses can greatly assist them to act more appropriately in performing their assigned tasks and acquiring the necessary clinical skills (9). Unlike other basic science courses, such as physiology and biochemistry, anatomy training requires its own teaching and learning tools and methods. These tools include corpse, moulage, atlas of human body, training videos, and slides. There are various ways to teach anatomy. In the study of Golmohammadi et al., regarding students' skills in hearing heart sounds, the results showed that superficial anatomy training of hearing heart sounds increases the chance of finding the precise location of hearing heart sounds which are of clinical importance (10). In another study by Mohammadi et al., the use of educational software in teaching anatomy was effective from the students' point of view (11). In a study done by Mehralizadeh et al., students believed that using new methods of teaching and applying a variety of teaching aids, teaching theoretical and practical materials together, expressing the importance of anatomy knowledge in the clinic, along with good expression by the professor had the most impact on learning anatomy courses; therefore, new methods of teaching theoretical and practical contents together were suggested (12). One of the

major concerns of medical students is the relevance of theoretical materials to their practical and clinical applications. To this purpose and to encourage students to be engaged with anatomy courses, new methods have been proposed so that they can enhance their practical skills (13-14).

In these new methods, students learn theoretical material about the structure and function of a healthy living person's body and then they learn the practical application of these materials (15). In PBL (Problem Based Learning) curricula or horizontal integration method, instead of teaching anatomy courses individually, the focus is on one subject and the topics are systematically taught. In this method, most relevant topics are taught together. However, in the vertical integration method, the teaching of basic and clinical science courses is combined and students do not learn these courses separately (15-17).

In a study by Khashay et al. regarding the viewpoints of medical interns on the clinical application of basic courses, the results showed a relative discrepancy between the basic science courses and the clinical courses. Depending on the future needs of physicians, this can cause changes in educational planning in the future. Therefore, the medical curriculum should be tailored to the needs of the community, and students can provide valuable insights about the curriculum and its impact on the learning process which is important in achieving academic success and informing educational managers (18).

Since the first step in curriculum planning is assessing the level of knowledge and needs assessment of the study groups, as well as considering the importance of anatomy courses in medical education, this study aimed to evaluate the importance of the application of anatomy in clinical practice from the viewpoints of intern and extern medical students in Mashhad University of Medical Sciences to suggest improvements by knowing the current situation and educational needs.

METHODS

This descriptive cross-sectional study was conducted by the census method after the approval of the plan by the Research Deputy and the Ethics Committee among medical students of Mashhad University of Medical Sciences in the academic year 2017-2018. The study population consisted of all intern and extern medical students at Mashhad University of Medical Sciences. 238 students were enrolled in the study through census method. Intern and extern medical students were selected since they had passed the basic science programs and had a better understanding of the use of anatomy in the clinic.

Inclusion criteria were: Attending general medicine course at Mashhad University of Medical Sciences, completion of all anatomy courses in basic sciences course 3, spending at least one internship course in one of the clinical departments in internships 4, desirable and informed Consent to participate in the study. Other medical students were excluded from the study due to the lack of clinical care. The self-administered and anonymous questionnaire was distributed to all students. The first part of the questionnaire included

demographic information of students, such as age, sex, course of study, and ward. The second part contained 18 questions about medical students' views on the importance of anatomy and its application in the clinic. The questions were on a Likert scale with very high (5), high (4), medium (3), low options. (2) And I have no idea (1), meaning they were designed to be assigned a rating of 1 to 5.

The third part of the questionnaire examined the medical students' aims from studying anatomy courses and their attitude towards the most effective ways of teaching and learning anatomy courses, so that it could help them improve their specialized skills, as well as their interest. The content validity of the questionnaire was checked by using the expert panel method. First, the initial design of the questionnaire was designed based on a review of previous studies (19-22), and then the initial version of the questionnaire was reviewed by 6 educational experts. Finally, CVR = 0.8, CVI = 0.8 were calculated and the validity of tools was confirmed. The reliability of tools was tested by test-retest method. The questionnaire was distributed to 15 students in two time intervals of two weeks and the correlation coefficient was calculated between the two test times (0.83). The reliability of the tools was also confirmed.

Data were analyzed using Kolmogorov-Smirnov test ($p > 0.05$). Descriptive statistics (mean, standard deviation, frequency distribution table) and analytical statistics (T-test, ANOVA, Chi-Square) were used for data analysis. The software used in this study was SPSS. V 16. It had 95% confidence interval and the significance level of $p < 0.05$ was also considered.

RESULTS

In the present study, a questionnaire was administered to 238 students. 147 (61.8%) of whom were extern medical

students or stager (fourth year) and 91(38.2%) were in their intern course (seventh year).

Regarding the medical students' viewpoint about the importance of anatomy and its application in clinic or practice in the intern course (seventh year), the highest score (mean \pm standard deviation) belonged to necessity of anatomy learning for medical students (3.82 ± 0.87). The difficulty of learning anatomy courses (3.63 ± 0.88) was the importance of learning anatomy in enhancing clinical specialized skills (3.59 ± 0.86). In the externs or stager course (fourth year), the difficulty of learning anatomy courses was (3.95 ± 0.8), the necessity of anatomy learning for medical students was (3.71 ± 0.97), and the importance of anatomy learning in enhancing clinical specialized skills was (3.24 ± 0.93). Overall, there was a significant difference between the two groups ($p = 0.03$), with the mean total score in the interns (61.63 ± 9.04) and externs. ($58/95 \pm 10/08$) obtained (Table 1).

The students' viewpoints about their most important goals of the study of anatomy courses showed that the highest mean score was related to improving the required specialized skills (1.80 ± 1.37) followed by the clinical significance of anatomy courses (1.47 ± 1.42) and the importance of anatomy courses in medicine (1.42 ± 1.29) respectively. However, there was no significant difference between male and female students' views ($P > 0.05$) (Table 2).

DISCUSSION

Basic science in medical education is a very important course. In fact, basic science is the first step in getting into clinics, since for an effective medical education there must be a continuous link between basic sciences and clinical practices (23). Among basic science courses, anatomy courses are of the most basic courses in medical education, and medical students deal with it during their early years of medical education. Despite changes made in the curriculum of anatomy courses in different universities, teaching anatomy is still based on lectures and corpse. The aim of this study was to evaluate the importance of anatomy in clinical practice from the viewpoint of intern and extern medical students in Mashhad University of Medical Sciences.

The results of the present study showed that students' viewpoints regarding the importance of anatomy and its application in clinical practice mean scores of extern students were lower than interns and there was a significant difference between them. The mean scores of male students

Table 1. The mean and standard deviation of medical students' viewpoints based on Grade and gender

Academic level	(Mean SD)	P- value
4years	58.95 \pm 10.08	0.039
7years	61.63 \pm 9.04	
Gender		0.003
Male	57.79 \pm 9.7	
Female	61.56 \pm 9.5	

Table 2. The mean and standard deviation of medical students' viewpoints about the purpose of studying anatomy courses by questionnaire questions and gender

purpose of studying anatomy courses	Gender/female mean SD	Gender/male mean SD	Total students mean SD	p-value
Success in exams	1.27 \pm 1.22	1.17 \pm 0.94	1.20 \pm 1.14	>0.05
Interested in anatomy lessons and engaging topic	1.50 \pm 1.14	1.46 \pm 0.91	1.48 \pm 1.04	>0.05
The importance of anatomy courses in medicine	1.48 \pm 1.34	1.34 \pm 1.24	1.42 \pm 1.29	>0.05
Clinical Importance of Anatomy Courses	1.48 \pm 1.40	1.46 \pm 1.45	1.47 \pm 1.42	>0.05
Improve the specialized skills required	1.84 \pm 1.48	1.73 \pm 1.23	1.80 \pm 1.37	>0.05

Table 3. The mean and standard deviation of medical students' viewpoints method of teaching anatomy by questionnaire questions and gender

Method of teaching	Gender/female mean SD	Gender/male mean SD	Total students mean SD	p-value
Teaching by lecturer method	1.65±0.7	1.81±0.56	1.72±0.65	>0.05
Teaching clinical and applied content simultaneously along with theoretical topics	1.05±0.57	1.26±0.57	1.14±0.58	0.03
Teaching clinical and applied content alone	1.44±0.72	1.51±0.62	1.47±0.68	>0.05
use of electronic tools and educational slides	1.43±0.72	1.62±0.59	1.51±0.67	>0.05
The use of mullein-atlas-cadaver and microscope	1±0.52	1.2±0.53	1.08±0.54	0.01
Review theoretical topics in practical classes	1.4±0.72	1.6±0.58	1.52±0.67	0.04
Teacher Lecture and Summary Discussion	1.52±0.72	1.65±0.59	1.57±0.67	>0.05
Practical description before teaching theoretical lessons	1.41±0.72	1.59±0.6	1.48±0.67	>0.05
Master's cordial attitude and graceful appearance	1.56±0.72	1.61±0.6	1.58±0.67	0.03
Regular and classified exams throughout the semester	1.57±0.72	1.71±0.57	1.66±0.63	>0.05

were lower than female students. In Nabil et al.'s study, there was no significant difference between the scores of two groups of students by their year of entry, but there was a significant difference between the two genders (24). In the study of Shariati et al., 44.7% of intern students and 42.9% of externs believed that abdominal parts should be paid more attention, while 52.6% of interns and 54.3% of externs wanted more attention in head and neck anatomy, as well as neuroanatomy section. The interns required more attention in basic science to viscera and the externs believed that nerves and lymph should be more discussed. But there was no statistically significant difference between students' opinions (25). In all these studies, students emphasized the importance of the anatomy course and the need to pay more attention to it. This requires proper educational planning in this field.

In this study, regarding the most important purpose of studying anatomy courses, the highest mean score was related to the study of anatomy aimed at improving the specialized skills needed (1.80±1.37); therefore, planning to increase clinical skills and application of the theories seems to be essential. In the study of Kemeir et al., students believed that anatomy courses were needed to increase their skills in clinical procedures such as lumbar puncture, catheterization, etc. (26). In the study done by Joon Cho et al., anatomy and its educational content were found to be essential in enhancing clinical skills and performing various techniques such as surgery (27).

In terms of students' viewpoints on teaching methods, the mean scores for lecturing and simultaneous teaching of clinical and applied content were higher than the other ones. There was a significant difference between male and female students regarding the simultaneous teaching of clinical and theoretical materials, using corpus and moulages, and theoretical discussions along with the practical and intimate approaches of the professors. It seems that establishing a link between theoretical and practical materials and applying the material taught in practice can be useful for effective learning and teaching topics. In a study by Fahimi Monzeri et al., male students found simultaneous teaching of theoretical and

clinical materials more necessary than the female students. In contrast, female students believed that improving the teaching methods of teachers was the most effective factor in improving the learning quality of this course (28).

In the study of Mehralizadeh et al., the use of moulage, good expression of the teacher, the presentation of clinical points during teaching, reviewing theoretical materials in the practical class, and the use of images had the most impact on learning anatomy (12).

Explaining the use of anatomy in clinical practices during teaching enhances the students' motivation in learning (29). As Lam et al. have shown, medical students are eager to learn clinical skills in their early years of study (30). From their first years of studies, students should be familiar with the relevance of theory lessons and their application in the clinic in order to gain a better understanding and to deepen their learning (29-31). As mentioned in the study by Bhangu et al. (32), according to students' views, teaching anatomy's theory along with clinical points, improve students' understanding of the material, which is consistent with the results of our study. The results of Hassanzadeh et al.'s study showed that medical students have a negative attitude toward basic science courses such as anatomy and believed that there is no relationship between theory and clinic, since one cannot use theoretical materials in the clinic (33).

Some studies have reported negative attitudes towards basic science courses, especially anatomy, due to the lack of consistency between the theoretical content and the practical needs of medical students (20, 34-36).

It is believed that anatomy, as one of the major courses of basic medical sciences, plays an important role in diagnostic reasoning and treatment in most specialties; also physicians rely heavily on anatomy science in imaging and physical examinations (35, 36). Therefore, sufficient knowledge of anatomy is essential for safe and efficient clinical practices (5). The results of the study by Gorgich et al showed that the level of knowledge of extern students regarding the importance of anatomy courses in the clinic was significantly lower than that of interns. Level of knowledge was significantly correlated with the type of clinical wards in

which students were undergoing their externship. They concluded that changing and using new methods in anatomy training can effectively teach anatomy lessons to medical students and enhance their attitudes toward the clinical relevance of anatomy courses (37). Students' awareness of the importance of anatomy courses was in line with the results of the study by Gorgich et al. On the other hand, the results of our study showed that there is a significant difference between male and female students' viewpoints about the importance of anatomy courses in the clinic; the score of female students were higher in this regard. The results of Plaisant et al.'s study showed that there is a relationship between personality traits and students' attitude toward anatomy lessons; male students had a negative attitude toward the importance of anatomy courses (21).

Therefore, various factors affect students' attitudes toward the importance and learning of anatomy courses, including their undergoing ward, gender, personality traits, and types of teaching methods.

Due to the quality of the educational system, the performance of faculty members and students, the teaching methods, the curriculum and its implementation, the use of modern educational technology, motivated learners, the provision of services with satisfaction, highly skilled and expert staff and performing internal evaluation in order to achieve social accountability, it is advisable to design clinical curricula and teaching methods in a way that students face with health challenges in the society and acquire the necessary capabilities to address health problems. Considering the future needs of physicians through changes in curriculum, the relative disparity between basic science and clinical courses may be eliminated (38, 39, and 18). Therefore, proper planning and management in this field seems necessary.

Finally, based on the results obtained from medical students about the clinical significance of anatomy and its effective methods of learning, it seems that teaching the clinical concepts along with theoretical content using new

educational methods may change the medical students' attitude toward the importance of anatomy courses and their application in clinical wards; however, increasing students' interest in learning more anatomy courses may increase their level of specialized skills in clinical wards. Considering the students' views of theoretical and lecture teaching, one of the limitations of the study referred to the students that are often familiar with one method of teaching, and these results are only obtained from a group of students at one university (Mashhad University of Medical Sciences).

According to the results of the present study, the intern and extern students' abilities to use anatomical knowledge in clinics, despite the efficiency of this information to provide better medical services for patients, refer to anatomy courses tailored to different specialties during internship and externship to increase the efficiency and productivity of anatomy knowledge in clinics. It can also be an effective step in enhancing students' motivation to learn anatomy by using teaching aids and enhancing the teaching skills of professors and categorized teaching for better learning of students. However, more detailed studies are needed to achieve this.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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