Original Communication

OPINIONS OF MEDICAL STUDENTS ABOUT PHASE I ANATOMY EDUCATION: A PRELIMINARY STUDY

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RESUMEN

Objetivos: La estandarización de la educación médica y programas centrados en la salida se han vuelto más importantes en los últimos años. Sin embargo, todavía no hay consenso sobre el lugar de las ciencias básicas en el mencionado concepto. A pesar que la importancia de la anatomía en la educación médica es indiscutible, su lugar en el currículo médico todavía se está discutiendo ampliamente. Varios estudios y observaciones se han publicado hasta hoy sobre la educación anatómica básica. La mayoría de ellos reflejan las opiniones de los médicos clínicos o tutores médicos. El número de estudios de evaluación de la educación en anatomía en el pregrado, desde la perspectiva de los estudiantes de medicina, es limitado. El presente estudio tiene como objetivo evaluar las opiniones de los estudiantes de medicina en las clases de anatomía. Material y métodos: En este estudio, a 102 estudiantes de medicina que completaron la fase II de la educación en la Universidad de Baskent se les dio un cuestionario con 32 preguntas de tipo Likert preparados por los Departamentos de Anatomía y Medicina de la Educación, entre diciembre de 2012 y mayo de 2013. Las preguntas fueron dadas a los estudiantes en junio, justo antes de terminar el período de educación relacionado. Resultados y Conclusiones: Los estudiantes de medicina enfatizaron que entendían la importancia de la anatomía mucho después de haber terminado la educación de fase I cuando estaban tomando los cursos clínicos y mencionaron que el aporte de sus conocimientos de anatomía básica para su práctica clínica era débil. Los resultados del estudio indicaron que los estudiantes prefieren una educación integrada verticalmente, con orientación clínica e interactiva, y dieron más valor a la práctica de laboratorio en lugar de las conferencias clínicas.

Palabras clave: *anatomía, educación médica, disección*

ABSTRACT

Objectives: Standardization of medical education and output-focused core programs has become more important in the recent years. However, still there is no consensus on the place of basic sciences in the aforementioned concept. Even though the importance of anatomy for a qualified medical education is indisputable, its place in medical curriculum is still being widely discussed. Several studies and comments have been published up to date on basic anatomy education. Most of these reflect the opinions of clinical doctors or medical tutors. The number of studies evaluating undergraduate anatomy education from the perspective of medical students is limited. The present study aims to evaluate the opinions of medical students on anatomy classes in medical education. Material and Methods: In this study, 102 medical students who completed phase II education in Baskent University were given a questionnaire containing 32 Likert's type questions prepared by the Departments of Anatomy and Medical Education between December 2012 and May 2013.The questioner was given to the students in June just before the education of the related term was completed. Results and Conclusion: The medical students emphasized that they understood the importance of anatomy long after they had completed phase I education while they were taking the clinical courses, and they mentioned that the contribution of their basic anatomy knowledge to their clinical practice was weak. The results of the study indicated that students preferred a vertically integrated, clinically oriented and interactive education, and gave more value to laboratory practice rather than the clinical lectures.

Key words*: anatomy, medical education, dissection*

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INTRODUCTION

Medical schools are highly assertive on the vocational knowledge and professional competence of their graduates. “Five star doctors” is a commonly denoted statement among medical tutors. Such a concept emphasizes the requirement of a highly qualified medical education. In recent studies, output-focused core programs have gained popularity. However, a qualified education should definitely be established on a strong basic medical knowledge. Detailed knowledge on the normal morphological and functional structure of the healthy human body is essential in order to determine pathological disorders. In medical curriculum, the mission of basic sciences is not only to give detailed knowledge on healthy human body, but to teach how the basic medical knowledge should be used during diagnostic approaches, clinical practices and treatment planning (Al-Wardy et al, 2009; Fitzgerald et al, 2008). Anatomy has been the unshakable foundation of medical curriculum for hundreds of years, indisputable it is still fundamentally important in medical study and practice, and forms the basis of medical education. However, anatomy education became a controversial area in the last ten years. Teaching styles, the level of the knowledge necessary for medical and surgical practice, and time dedicated to the gross anatomy courses during the undergraduate curriculum are still being widely discussed among doctors and medical educators (Al-Gindan et al, 2000; Al-Shehri et al, 2001; Patel and Moxham, 2006). In recent years, most of the academic staff believes that conventional models do not encourage students for the quality of anatomy knowledge and using it in the medical practice (Fitzgerald et al, 2008; Dowson et al, 2009). On the other hand, tendency to problem-based learning grows the idea of giving more spare time to medical students to study and to use their knowledge, and to make the way for a further community-based undergraduate course. In the conventional curriculum, anatomy is taught first, and then the various regions of the body. The related histology, embryology and physiology is taught together to make the student understand the body regions, and the relationships of the organs and systems (Nayak et al, 2008). However in problem based learning, anatomy education is given completely in relation to the clinical cases. Problem - based learning allows for the horizontal and vertical integration of the different disciplines, and integrated knowledge prepares students better for an actual clinical progress (Prince et al, 2003). Teaching and learning anatomy suffers just like the other disciplines of basic medical sciences (Nayak et al, 2008). Students educated with problem-based learning technique emphasize that they feel insufficient especially in anatomy, among other basic sciences (Prince et al, 2000). Independent from the way of teaching anatomy, knowledge given in the earlier part of the undergraduate curriculum cannot be remembered by the students when they actually need it, and it should be revised later. Most of the clinical tutors have emphasized that, rather than spending time for teaching clinical medicine on a qualified background, they try to rebuild the basic science knowledge of the students (Dowson et al, 2009). On the other hand, it is well-known that general preclinical average is highly correlated with the success in the clinical courses (Al-Wardy et al, 2009).

Students do not believe that they had received sufficient anatomy during their undergraduate education especially when this is evaluated in relation with their academic performance (Fitzgerald et al, 2008). The undergraduate students perceive deficiencies in their anatomical knowledge when they start clinical training, regardless of their school’s clinical training (Bergman et al, 2008). It is obvious that the lack of basic anatomy knowledge impairs students’ ability to benefit from the clinical education not only in their undergraduate program, but also in their subsequent postgraduate education (McHanwell et al, 2007). In addition to medical students, clinical tutors also perceive current anatomy education as inadequate (Waterson and Steward, 2005). Recent studies report the incidences of the clinical errors made in the clinical practice due to lack of the anatomy knowledge (Goodwin, 2000).

Since a consensus has not been reached yet, there is still a need for a comprehensive revision on the anatomy education. The present study reports the opinions of phase III (Terms IV, V) and phase IV (Term VI) medical students on phase I (Terms I and II) basic anatomy education; the way of teaching, time dedicated to anatomy, the benefits of basic anatomy knowledge on clinical education and practice, and the most suitable place for anatomy classes in medical curriculum.

MATERIAL AND METHODS

Subjects

A total of 102 students who had completed phase II education in Başkent University Medical School between September 2012 and May 2013 participated in the study. Of those 102 students

42 were term IV, 37 were term IV students and 23 were interns. The questionnaires were given to the students in June, just before the education of the related term was completed. The students were wanted to answer the questionnaire alone in order to prevent the interaction among them. The questionnaires were than collected by someone who is not a member of the academic staff. Only the ones who were willing to answer the questionnaire participated in the study. The first two years of the medical school when the basic sciences are given were accepted as Phase I, third year when propedeutics is given as Phase II, fourth and fifth years when clinical courses go on as Phase III, and internship was regarded as Phase IV in the present study.

Questionnaire

The questionnaire was composed of 32 questions. Of those, 26 were devised as five-point Likert scale responses as “strongly dis-agree”, “disagree”, “neither”, “agree”, “completely agree” in order to explore the thoughts of the medical students on the time dedicated to anatomy classes, the methodology used in phase I anatomy education, the efficiency of theoretical and practical classes and the reflections of phase I anatomy knowledge on the clinical education and approaches. The fourth and fifth levels of the Likert scale were considered as positive answer. Four questions were three-point Likert questions as “great”, “partially” and “a few” in order to get detailed knowledge about the contribution of anatomy knowledge to basic and clinical education in the medical curriculum. Students opinions on the best place for anatomy education in medical curriculum were also evaluated by a question that consists five choices as “in 1st and 2nd terms”, “in 2nd and 3rd terms”, “in 4th and 5th terms”, “in 2nd, 4th and 5th terms”, “in 2nd, 3rd, 4th and 5th terms” of the medical school. At the last question of the questioner students were wanted to enumerate the basic science classes (anatomy, biochemistry, biophysics, histology and embryology, medical biology, microbiology and physiology) according to their harshness.

All questions were prepared by the members of the Departments of Anatomy and Medical Education, by the participation of Biostatistics Department.

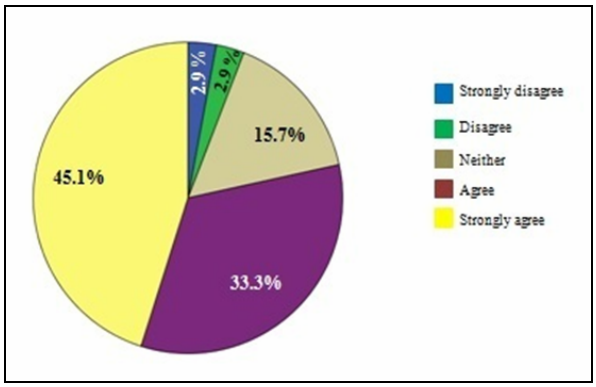
Statistical Analyses

The statistical analysis of the data collected was performed using the statistical package program for social sciences, version 17.0 (SPSS for Windows, Chicago, IL, USA). Chi-square test and descriptive statistics were used to analyze the data. In all statistical evaluations, 0.05 was taken as the cut off for the level of significance.

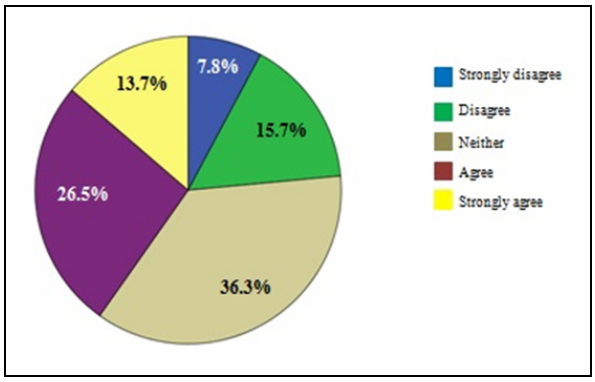
RESULTS

Time dedicated to anatomy education

Of the students who had completed Phase II education, 45.1% (13.7% + 31.4%) expressed that time dedicated to anatomy classes was more than it was actually needed while 32.3% of them thought the opposite (23.5% + 8.8%). On the other hand, when the students were asked to evaluate the time dedicated to anatomy hands-on training, 64.7% (30.4% + 34.3%) of them suggested that they actually needed the time they had been given for anatomy practice. Most of the students [78.4% (45.1% + 33.3%)] emphasized the importance of the time they had spent in anatomy laboratory, and its contribution to their anatomy knowledge. Only 5.8% (2.9% + 2.9%) of them denoted that they could not actually benefit from the anatomy hands-on training (Graphic 1). When the students were asked whether they had been bored by unnecessary repetitions, the majority of the group [77.0% (51.0% + 26.0%)] indicated that anatomy knowledge had not been repeated purposelessly.



Graphic 1. Anatomy practical classes helped me in learning basic anatomy knowledge



Graphic 2. Anatomy knowledge given in phase I is essential for the clinical education in phase III

Contribution of anatomy knowledge to clinical education and practice

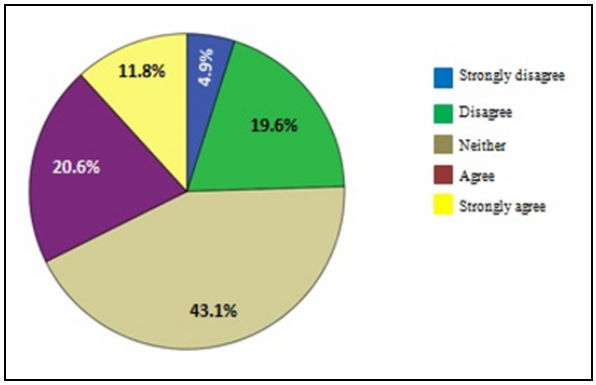
The students were later asked to consider the importance of anatomy in their later education, and its reflection to clinical practice. More than half of the students [65.7% (41.2% + 24.5%)] mentioned that they understood the importance of anatomy after they completed Phase II education. When the students were asked to evaluate the benefits of Phase I anatomy education, 40.2% (13.7% + 26.5%) of them indicated the essentiality of Phase I anatomy knowledge for their further undergraduate education while 36.3% of them partially believed in the importance of the contribution of anatomy knowledge to their clinical education. Among all, 23.5% (15.7% + 7.8%) of the students think the opposite, and stated that anatomy knowledge provided in Phase I did not benefit them (Graphic 2) ($P<0.05$). The contribution of phase I anatomy knowledge to clinical education was also evaluated in relation with the courses given in the clinical curriculum. More than 50% of the students expressed that anatomy knowledge provided in phase I certainly helped them for understanding the education given in surgical courses, especially in general surgery, cardio-vascular surgery, orthopedics and traumatology, and gynecology and obstetrics (Table 1).

Surgical course	n	Great	Partially	A few
General surgery	82	73.2 %	22.0 %	4.8 %
Obstetrics and gynecology	82	72.0 %	19.5 %	8.5 %
Orthopedics and traumatology	83	69.9 %	22.9 %	7.2 %
Cardiovascular surgery	81	65.4 %	28.4 %	6.2 %
Neurosurgery	82	59.8 %	30.5 %	9.8 %
Pediatric surgery	82	53.7 %	34.1 %	12.2 %
Ear nose throat	82	50.0 %	40.2 %	9.8 %
Ophthalmology	82	45.1 %	30.5 %	24.4 %
Plastic and reconstructive surgery	81	44.4 %	42.0 %	9.8 %
Urology	83	43.4 %	43.4 %	13.3 %
Anesthesiology	82	29.3 %	50.0 %	20. 7%
Medical course				
Physical Therapy andRehabilitation	100	61.0 %	34.0 %	5.0 %
Cardiology	99	52.5 %	38.4 %	9.1 %
Neurology	95	50.5 %	35.8 %	5.0 %
Radiodiagnostic	84	33.3 %	40.5 %	26.2 %
Internal medicine	83	29.0 %	45.2 %	25.8 %
Pediatric	100	23.0 %	48.0 %	29.0 %
Forensic Medicine	85	20.0 %	35.3 %	44.7 %
Dermatology	96	12.5 %	32.3 %	55.2 %
Pulmonary Medicine	90	37.8 %	40.0 %	22.2 %

Table 1. The contribution of anatomy knowledge to clinical education in surgical and medical courses

Anatomy knowledge did not contribute to medical clinical education when compared to the surgical courses. However, more than 50% of the students stated that anatomy knowledge was certainly important and helped them for understanding the clinical education better an easier, particularly when physical therapy and rehabilitation, cardiology, and neurology courses

were taken into consideration (Table 1) (P<0.05). On the other hand, only 32.4% (11.8% + 20.6%) of the students who had completed Phase II education emphasized that they used their anatomy knowledge during their clinical practice, and 43.1% of them indicated that they partially used it during their internship. Remaining 24.5% (19.6% + 4.9%) mentioned that they did not use Phase I basic anatomy knowledge in their clinical practice (Graphic 3). While 38.7% (23.8% + 14.9%) of the students believed that under-graduate anatomy education would benefit them in their future professional life as doctors, 32.7% of them partially believed that.



Graphic 3. Anatomy knowledge given in phase I is essential for the clinical practice

	n	Great	Partially	A few
Bones and joints	102	59.8 %	31.4 %	8.8 %
Upper and lower limbs	**Topics**	56.9 %	35.3 %	7.8 %
Cardiovascular system	102	50.0 %	40.2 %	9.8 %
Male and female genital systems	102	50.0 %	40.2 %	9.8 %
Urinary system	101	49.5 %	39.6 %	10.9 %
Respiratory system	102	49.0 %	41.2 %	9.8 %
Gastrointestinal system	100	47.0 %	44.0 %	9.0 %
Central nervous system	102	38.2 %	41.2 %	20.6 %
Special sense organs	102	36.9 %	49.0 %	14.7 %
Head and neck anatomy	102	36.3 %	49.0 %	14.7 %

Table 2. Students opinions on the recollection of various topics related with anatomy

Most of the students suggested that, when compared to the other subjects, it was harder to learn and remember central nervous systems', special sense organs' and head and neck region's anatomy (Table 2). However, they stated that central nervous system anatomy contributed to clinical knowledge the most, following cardio-vascular system anatomy (Table 3).

We also wanted to evaluate the contribution of anatomy education in understanding the other lessons given in Phase I. Approximately 53% of the students denoted that anatomy knowledge presented in Phase I certainly helped them for understanding physiology better and easier (P<0.05).

Methodology used in anatomy education

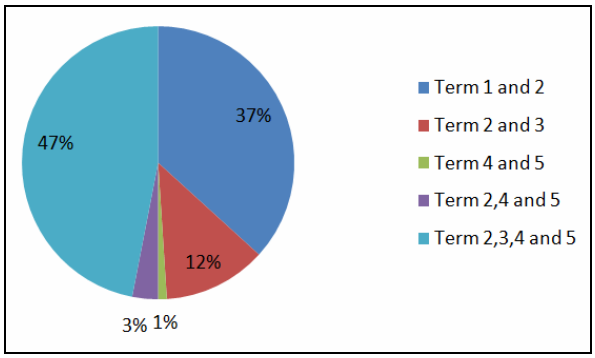
When the students were asked to evaluate the methodology used in anatomy training, more than half of the students (76.2% = 37.6% +38.6%) indicated that anatomy education should be given in relation with clinical knowledge and practice, and should be invigorated with clinical examples. Among all, 68.6% (24.5% + 44.1%) of the students suggested that, instead of classical lectures, courses based on solving a related clinical case by using basic knowledge as a group work would make the medical students to learn anatomy better**.** On the other hand, 73.6% (27.5% + 46.1%) of the students wanted to do their own dissections during hands-on training. More than half of the students denoted that watching the teaching staff during cadaver dissection would make them understand the anatomical structures and dissection technique better. However, while studying the anatomical structures on the artificial models or in the cadaver, they mostly wanted the teaching staff to identify the structures.

The place of anatomy education in medical curriculum

Topics	n	Great	Partially	A few
Cardiovascular system	100	66.0 %	29.0 %	5.0 %
Central nervous system	99	64.6 %	29.3 %	6.1 %
Upper and lower limbs	100	64.0 %	33.0 %	3.0 %
Male and female genital systems	100	60.0 %	32.0 %	8.0 %
Bones and joints	100	59.0 %	37.0 %	4.0 %
Urinary system	100	57.0 %	40.0 %	3.0 %
Head and neck anatomy	100	55.0 %	36.0 %	9.0 %
Gastrointestinal system	100	54.0 %	43.0 %	3.0 %
Respiratory system	100	53.0 %	43.0 %	4.0 %
Special sense organs	100	50.0 %	40.0 %	10.0 %

Table 3. Students opinions on the contribution of various topics to clinical education and practice

A vertical anatomy education from the second to the fifth term was preferred by 45.1% of the students. However, 35.3% of them suggested that anatomy education in the first two years of medical curriculum would be enough (Graphic 4).



Graphic 4: Student opinions on the place of anatomy education in medical curriculum

DISCUSSION

Anatomy education in undergraduate medical curriculum has been widely discussed for years. However, a consensus has not been reached up to date. In the recent years, there was a great tendency to decrease the time dedicated to classical lectures to leave more spare time to medical students to study and practice (Pryde and Black, 2005; Khan et al, 2011). In contrast, clinical tutors noted that the students did not have sufficient anatomy knowledge (Waterson and Steward, 2005), and emphasized an increase in the anatomy-related clinical errors in clinical practice (Fitzgerald et al, 2008; Goodwin, 2000). Those opinions of the medial tutors and that of new graduated doctors emphasize the need for a revision on anatomy education in medical schools. Not only the medical tutors, but also the medical students complain of insufficient anatomy education, especially the ones who intend to make a career in surgical branches (Fitzgerald et al, 2008).

More than 50% of the students participated in the present study indicated the importance of basic anatomy knowledge for surgical courses, especially for general surgery, gynecology–obstetrics and orthopedics–traumatology, respectively, and for medical courses such as physical therapy and rehabilitation, cardiology and neurology, similar to those of Aberdeen School of Medicine (Dowson et al,2009). However, most of the students stated that they understood the importance of anatomy long after they had completed Phase I education, while they were taking the clinical courses. In addition to this, it is well known that students forget their basic knowledge by time when they get to Phase III (Bergman et al, 2008). About 25% of the students expressed that they wished for ongoing anatomy teaching or reinforcement throughout the later clinical years of the medical school, in order to fully benefit their clinical learning experience, and use the basic anatomy knowledge properly in the clinical practice (Fitzgerald et al, 2008; Dowson et al, 2009). In the present study, approximately a quarter of the students stated that they did not benefit from the basic anatomy knowledge during their clinical education, and especially during their clinical practice. Is the only reason of this major problem the long time passing between Phase I education

and the clinical courses, or the lack of the correlation between basic anatomy education and clinical practice? More than 70% of the students believed that a clinically oriented anatomy education should be given, and it should be supported by courses based on solving a related clinical case. It is reported in the literature that "The game format teaching strategy" had an extra advantage in retaining knowledge of the subject for a longer time compared to a lecture format (Khan et al, 2011). These results bring the problem-based learning into mind, since this is supposed to enhance the integration of students' knowledge (Prince et al, 2003; Barrows, 1986). The main mission of problem-based learning is not to help students to acquire a larger amount of knowledge, but to foster their ability to apply what they have taught (Bergman et al, 2008). Integrated knowledge given or obtained during problem-based learning would prepare students better for an actual clinical practice (Regehr and Norman, 1996). On the other hand, studies on students who had a problem- based learning reported that the students felt themselves insufficient for their basic science knowledge, especially for anatomy, and claimed that the lack of dedicated courses caused uncertainty, therefore the students perceived themselves as inadequately prepared to clinical practice (Prince et al, 2003; Prince et al, 2000). However, the results of most of the studies on problem-based learning suggested that the students studying in schools using problem-based learning experienced deficiencies in anatomy knowledge, similar to those in the other schools (Prince et al, 2003). It has been known that, even if basic science knowledge is presented in relation with clinical cases in phase I education, the students forget the basic knowledge during the period passing between phase I and the clinical courses. These results highlight a need for vertical integration of anatomy to the medical curriculum. This method has already been introduced in some medical schools (Evand and Watt, 2005). In the present study, 47% of the students stated that anatomy education should be presented vertically during the terms 2-5. However, 36.7% of them believe that the first two years of the medical school would be enough for anatomy education.

During the last decade, there were considerable changes in medical curricula with an emphasis on the basic concepts, rather than detailed knowledge. Anatomy, perhaps more than other disciplines, has undergone significant changes, and there has been dramatic reduction in the amount of anatomical content (Nicholson, 2005). Conversely, anatomists complain of the reduction of the curricular time dedicated to anatomy, and assert that spending more time on a subject results in more knowledge (Verhoeven et al, 2002). However it is just not feasible (Bergman et al, 2008). Diminished time should be used in the most effective way. It is generally agreed that understanding clinically relevant anatomy is essential for surgical practice and other medical and paramedical professions, and this is why anatomists and surgeons need to work together not only for an undergraduate program, but also for a postgraduate education (Nicholson, 2005). Although approximately 45% of the students in the present study suggested that the time dedicated to classical lectures was more than actually needed, more than 50% of them stated that taking lectures helped them to understand the knowledge better. On the other hand, contrary to their ideas about classical lectures, about 65% of them stated that they had actually needed the time they spent in anatomy hands-on training, and preferred to do their own dissections. However, they insisted on presence of a medical tutor during their dissections. It is clear that hands-on dissection not only helps students to develop professional competencies, but also facilitates the skills for a team work, time management and coping with stress (Swartz et al, 2002; Böckers et al, 2010). Unfortunately prosection-based courses are present in the medical curriculum of most of the medical schools in the country. Even though the students do not perform their own dissections, 50% of them confirmed that anatomy practices disciplined them in learning and studying anatomy.

The results of the present study show that medical students definitely prefer a clinically oriented anatomy education, and place value to anatomy hands-on training much more than classical lectures. The time period between basic anatomy education and the clinical courses may be the main disadvantage of horizontally integrated medical curriculum that prevents the contribution of anatomy knowledge to the medical practice. The opinions of the students on the ongoing anatomy education should make us, the medical tutors, to think on a clinically oriented, vertically integrated curriculum supported by increased anatomy hands-on training hours, giving opportunity to the students to do their own dissections.

Conflict of Interest

This study was presented as a poster presentation in XVIth National Congress of Anatomy, 11th-14th September, 2014, Malatya, Turkey; but it was published in any journal before.

We would like to mention that no financial support was taken for his study and there is no conflict of interest for all the authors.

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Ethical Approval
This study was approved by Baskent University Intuitional Review Board and Ethics Committee (Project no: KA 12/73).

Informed consent
Not necessary

Contributions
Dr. Kurkcuoglu, Dr. Pelin and Dr. Zagyapan took place in the preparation of the questionnaire, and Dr. Ogus has contributed to the statistical analysis.

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