

RESEARCH ARTICLE

An Overview of Knowledge Levels about Organ Topography and Structure among Grade IV Medical Students

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Abstract

One of the competencies the students of the graduate medical education is to apply the basic principles of the science of biomedicine, epidemiology, clinical, and behavior in the practice of medicine. Anatomy is one of the biomedicine sciences learned in medical education, including learning about the body's structure and organ topography. This research aims to describe the organ's structure and topography knowledge among the faculty of medicine students. This survey with 88 students was conducted in a faculty of medicine in Bandung city from October to December 2018 using a random sampling method. Statistical analysis using frequency distribution, percentage proportions, and Wald's statistics in the 95% confidence interval. The instrument for validity analysis is Pearson's correlation, and the instrument for reliability analysis is Kappa's percent agreement. The results showed the average level of knowledge on organ structure and topography. It shows anatomical teaching and learning about the organ's structure, and the topography still needs to be optimized.

Key words: Anatomy, structure, topography

Gambaran Tingkat Pengetahuan tentang Struktur dan Topografi Organ pada Mahasiswa Tingkat IV Kedokteran

Abstrak

Salah satu kompetensi lulusan mahasiswa pendidikan kedokteran adalah mampu mengaplikasikan prinsip ilmu dasar biomedik, epidemiologi, klinis, dan perilaku dalam praktik profesi kedokteran. Anatomi merupakan salah satu ilmu biomedik dalam pendidikan kedokteran yang mempelajari struktur dan topografi organ. Penelitian ini bertujuan mengetahui tingkat pengetahuan mahasiswa tingkat IV fakultas kedokteran mengenai struktur dan topografi organ. Survei terhadap 88 mahasiswa ini dilaksanakan di sebuah fakultas kedokteran di Kota Bandung dari bulan Oktober hingga Desember 2018 menggunakan metode random sampling. Analisis statistik menggunakan distribusi frekuensi, persentase proporsi, dan *Wald's statistic* dalam 95% interval kepercayaan. Analisis validitas menggunakan *Pearson's correlation*, sedangkan analisis reliabilitas menggunakan *Kappa's percent agreement*. Hasil penelitian menunjukkan tingkat pengetahuan rerata tentang struktur organ dan topografi dalam kategori cukup. Hal ini menunjukkan pembelajaran anatomi tentang struktur organ dan topografi masih perlu dioptimalkan.

Kata kunci: Anatomi, struktur, topografi

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Introduction

The free entry of health workers, including doctors from ASEAN countries, to Indonesia, requires doctors in Indonesia to improve the quality to compete with the foreign doctor.¹ To improve Indonesia's doctor's quality, governments make laws No. 20 of 2013 of medical education, mentioning that to become a doctor has to be through academic and professional medical education. The curriculum used during the academic excellence should refer to national standards of Medical Education Core Curriculum, namely physician education Indonesia (KIPDI) III. Based on KIPDI III, basic medical science should be integrated with graduates' needs in the exercise of the profession.^{2,3}

Based on the National Accreditation Agency higher education (BAN-PT), 72 medical schools have produced graduates. Of the 72 faculty, only 21 medical faculties are accredited A, 46 faculty have the B accreditation, and five are accredited C. It takes the role of many stakeholders in improving the quality of education in Indonesia.⁴

One of the graduates' competencies is to apply the basic principles of the science of biomedicine, epidemiology, and clinical behavior and practice in the medical profession. One of the biomedicine sciences is anatomy.⁵ Anatomy is the cornerstone of medical education; anatomical knowledge is undoubtedly essential for doctors regardless of their specialty, particularly since they continue to perform physical examinations, make medical decisions, communicate with colleagues, and provide explanations to patients.⁶ Anatomists and clinicians agree that accurate knowledge of anatomy is vital to ensure a safe and efficient clinical practice.^{5,7}

We survey to observe the competence in the field of anatomy to understand the level of knowledge of the organ's structure and topography among the medical student.

Methods

This research was conducted in the faculty of medicine in Bandung from October to December 2018. This study using a survey approach is applying the random sampling method. The validation and reliability testing questionnaire is done before doing the survey. The subject in this research was medical students at level IV 2018/2019 school year. The subject was prompted to fill in a questionnaire that contains the knowledge of the structure and topography of the organ, and the result is a level of knowledge grouped into low, medium, and high levels of knowledge.

The study has been ethically approved by the Research Ethics Committee of Faculty of Medicine, Universitas Islam Bandung with the certificate number is 373/Komite Etik. FK/X/2018.

Results

The research recruited 88 students.

The highest median value of the knowledge of the organ structures is in the endocrine metabolic system (EMS), while the lowest is present in the special sense system (SS). SS system with minimal value in a cardiovascular system (CVS) and SS that is 0. The highest value of 100 was found in the reproductive system (RPS), SS, and CVS (Table 1).

Knowledge of organ topographic shows

Table 1 Frequency Distribution of Knowledge about the Structure of the Organ

	DMS	EMS	NBSS	GUS	RPS	SS	CVS	GIS	RESPI
Min	22.22	27.27	7.69	10	20	0	0	12.5	0
Median	55.56	63.64	53.85	50	60	40	50	43.75	33.33
Max	88.89	90.91	92.31	90	100	100	100	87.5	100
Mean	53.79	60.74	52.27	53.95	61.02	49.54	53.98	46.02	39.96
SD	14.48	16.63	20.21	17.76	14.31	23.09	25.01	17.83	17.96
LB	39.31	44.11	32.06	36.19	46.71	26.45	28.97	28.19	22
UB	68.27	77.37	72.48	71.71	75.33	72.63	78.99	63.85	57.92

Note: DMS=dermatomuscular system, EMS=endocrine metabolic system, NBSS=neurobehaviour system, GUS=genito urinary system, RPS=reproductive system, SS=special sense system, CVS=cardiovascular system, GIS=gastrointestinal system, RESPI=respiration system

Table 2 Frequency Distribution of Knowledge about the Topography of the Organ

	DMS	EMS	NBSS	GUS	RPS	SS	CVS	GIS	RESPI
Min	10	0	0	14.28	33.33	0	0	0	0
Median	60	50	44.44	57.14	66.67	50	37.5	57.14	42.86
Max	90	100	100	100	100	100	75	100	85.71
Mean	59.43	55.87	46.46	56.98	69.95	64.49	42.33	57.47	41.39
SD	18.89	24.5	22.82	20.14	14.51	25.06	18.71	22.29	19.26
LB	40.54	31.37	23.64	36.84	55.44	39.43	23.62	35.18	22.13
UB	78.32	80.37	69.28	77.12	84.46	89.55	61.04	79.76	60.65

Note: DMS=dermatomuscular system, EMS=endocrine metabolic system, NBSS=neurobehaviour system, GUS=genito urinary system, RPS=reproductive system, SS=special sense system, CVS=cardiovascular system, GIS=gastrointestinal system, RESPI=respiration system

interesting findings as listed in Table 2. The lowest values showed in EMS, NBSS, SS, CVS, GIS, and RS. The highest median value there is in the RPS. There was a maximum value of 100 in the EMS, NBSS, GUS, RPS, SS, and GIS. The comparison median value of the structure and topography is shown in Figure. The knowledge structure's median values are less than the topography knowledge in the DMS, GUS, RPS, SS, GIS, and RS. However, it does not occur in a system of EMS, NBSS, and CVS.

The value of the level of knowledge of organs' structure is smaller than the value of the level of knowledge of the organ's topography at DMS, GUS, RPS, SS, GIS, and RS. The value of the level of knowledge of an organ's structure is higher than the value of the level of knowledge of the organ's topography at EMS, NBSS, and CVS

(Table 3).

The Largest proportion of results level of knowledge about the structure and topography in all organ systems are in the category of average.

Discussion

Anatomy is the study of the structure of the human body.⁸ Anatomy is sound basic science to become the foundation for physicians in conducting physical examinations, diagnosis, and understanding the patient's disease condition.⁹ By learning gross anatomy, medical students get a first "impression" about the structure of the human body, which is the basis for understanding pathologic and clinical problems.¹⁰ Although anatomy is a basic science in medical education; many students feel difficulties in studying

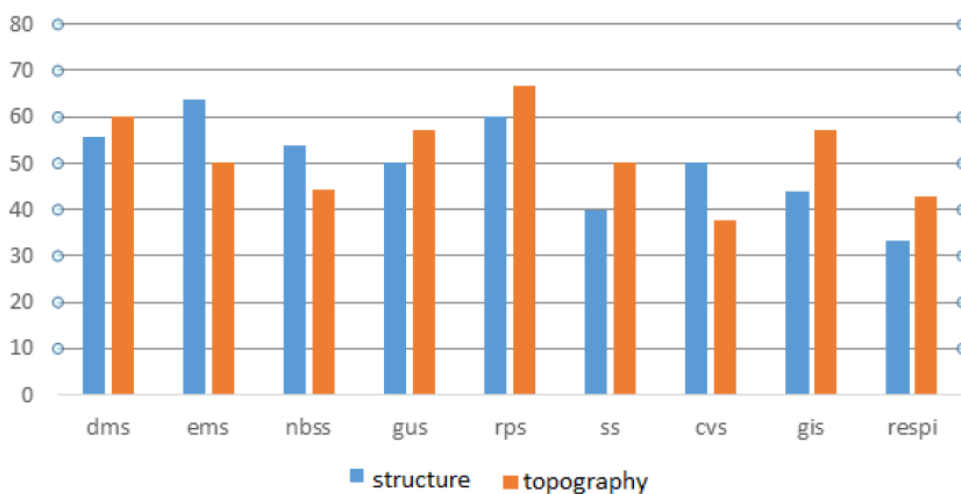


Figure Comparison Median Value of Knowledge about the Structure and Topography between Systems

Table 3 Proportion Knowledge of Structure and Topography in All Modul System

Modul System	Knowledge	Proportion of Knowledge		
		Low (%)	Average (%)	High (%)
DMS	Structure	17.04	75	7.95
	Topography	21.59	54.54	23.86
EMS	Structure	13.64	71.59	14.77
	Topography	11.36	65.91	22.73
NBSS	Structure	21.59	57.95	20.45
	Topography	23.86	60.23	15.91
GUS	Structure	11.36	80.68	7.95
	Topography	14.77	69.32	15.91
RPS	Structure	7.95	73.86	18.18
	Topography	10.23	72.73	17.04
SS	Structure	15.91	62.5	21.59
	Topography	12.5	64.77	22.73
CVS	Structure	13.64	59.19	27.27
	Topography	11.36	63.64	25
GIS	Structure	20.45	69.32	10.23
	Topography	15.91	69.32	14.77
RESPI	Structure	15.91	69.32	14.77
	Topography	17.04	71.59	11.36

Note: DMS=dermatomuscular system, EMS=endocrine metabolic system, NBSS=neurobehaviour system, GUS=genito urinary system, RPS=reproductive system, SS=special sense system, CVS=cardiovascular system, GIS=gastrointestinal system, RESPI=respiration system

anatomy.¹¹ This is apparent from the research results are listed in Table 1 dan Table 2, which shows the range of great value, i.e., the existence of a minimum value of 0 and a maximum value of 100.

Over the past few decades, the medical education paradigm has evolved to focus on problem-based, clinical competency-accentuated approaches, student-centered, and integrated.¹² Anatomy can be made easy by modifying the traditional anatomy education delivered by didactic lectures and cadaveric dissection. The curriculum in Anatomy should be delivered by combining different methods of teaching. Computer-assisted, problem-based learning, self-directed and directed self-learning in addition to traditional one can be used.¹³ For centuries, the primary tools for teaching anatomy have been lectures, tutorials, textbooks, cadaveric dissections, and demonstrations from prosected specimens.¹⁴ Anatomy lesson with tutorials and laboratory activities in this medical faculty using active learning principles; where students expected to be active and become the actors in the learning environment. They participate in the process of higher-order thinking, such as analysis,

synthesis, and evaluation. However, in practice, most students seem to position themselves as passive learners, accepting only what is to be delivered by the lecturer.

Another thing that might cause this statement is that anatomy is a material that many use in Latin. The material for the anatomy lessons was so many, while learning time is minimal 10. Other factors some students are not ready to follow the tutorials or laboratory activities. Students sometimes do not know what material they will learn during tutorials and laboratories to not keep up with the good learning activities. Students are often not doing homework or practicing laboratory activities and not making flipcharts properly during tutorials.¹⁵ To make the medical students interested in anatomy, various new methods have been proposed, which could improve their practical skills. In these methods, the students, while studying the theoretical subjects, are introduced to body structures and functions on the alive and healthy person and then learn their practical usage.¹⁶

Figure 1 shows that the value of the level of knowledge of organs' structure is smaller than the value of the level of knowledge of the organ's

topography at DMS, GUS, RPS, SS, GIS, and RS. Many organs should be studied in detail the structure of these systems, so students' chances to forget about the name of the structure in each of these organs is larger. DMS system, students study the structure of each group contains the bones of the axial and appendicular. In the system, GUS students must study the structure of the kidneys' organs, ureters, bladder, urethra, and genital organs male internal-external. In the RPS, students must learn the internal genital organs-external women following hip diversionary bones. In the special sense system (SS), students must learn the eyes and ears' organ. In GIS, students studying the organs' structure directly in the digestive system starts from the nose to anus and digestive organs accessories. Respiratory system-students learn all the organs involved in respiration starts from the nose to the lungs. The topography is the organ study based on its location and its relationship with other organs around it. Studying the layout of this organ requires students to imagine or envision an organ against the layout of other organs. Some students feel difficulties in studying topography, which is apparent from the questionnaires like EMS and NBSS. The Results showed in the CVS the level of knowledge about the organ structure that is higher than the organ's topography level. Students may have difficulty learning the subject matter of the anatomical sciences. Reasons for this may include issues with motivation, course content, and the quantity of information.¹⁷

Real success in education can be achieved through a combination of motivation, creativity, innovation, inspiration, and teamwork. The role of a teacher as a knowledge provider cannot be denied. However, a teacher or a facilitator as a motivator is brought out with this project. The teacher here is initiating the chain reaction with his/her motivation.¹⁸

Research results in Table 3 show the largest proportion of results level of knowledge about the structure and topography in all organ systems are in the category of "average." It shows anatomical teaching and learning about the organ's structure, and the topography of the organ has been running quite well but has yet to achieve maximum results. Students learn anatomy through tutorials and laboratory activities using a mannequin and saw the cadaver. Students know the science through the textbook and see in real through mannequin knowledge is the result of

knowing, and this happens after people doing mainly against an object sensing. Various models (plastic, animal tissue, computer, etc.) have been useful for learning human anatomy in several different contexts. Sensing happens through sense human being; sight, hearing, smell, taste, and touch. Students should understand why specific terms are used in clinical medicine to ensure their correct use and resolve any discrepancies between the official terminologies and those specifically used in clinical medicine.¹⁹

Most human knowledge is obtained through the eyes and ears. The knowledge covered in the cognitive domain has six levels, knowledge, understanding (comprehension), application, analysis, synthesis, and evaluation.²⁰ The results of the study could not be released from the learning process. The learning process involves faculty and students.²¹

Motivation needs to be owned by a student through the process of learning, motivation can push someone, so eventually, that person becomes a specialist in a particular field of science. Someone would like to try to learn something with his best if he did not know how important and helpful the results will be from his studies.²²

In the learning process, a student's interest is vital. For someone who has no interest in learning is not possible to do the learning activities. Interest is "symptoms that are interested in anything which further interest someone will reflect its purpose." Suppose the interested student to a particular lesson can be viewed and observed on working in this lesson. This interest plays a vital role in teaching and learning. Without any interest, then he could not master the lessons given.²³ Medical students need anatomy lessons modification of its teaching methods to makes them more interested in anatomy and can also help them improve their professional skills.²⁴

In the world of education, the lecturer is the cutting edge of education. A lecturer is the direct perpetrator of the service's activities. The lecturer's quality will affect the quality of education services—the lecturer's quality is determined by educational background, personality, and ability to communicate. Interpersonal communication skills that a lecturer must master are empathy, equality, confidence, immediacy, supportiveness, positiveness, interaction management, and listening.²¹

Empathy means a lecturer should feel what is perceived by the student while teaching and

learning activities taking place. Supportiveness intent is a college lecturer should create a sense of comfort when teaching and learning take place. Positiveness intent is a college lecturer should make students feel valued and not be underestimated. Equality means a college lecturer should be able to give equal treatment to all its student in the process of teaching and learning. Confidence means a lecturer should have the self-confidence to foster students' beliefs against the lecturer as someone who can be relied upon when they need information. Immediacy means that lecturers should show concern and interest in students' problems in the process of teaching and learning. Interaction management significance means a college lecturer should be able to manage the process of good teaching and to learn so that students can understand what is delivered by lecturers and lecturers to understand what is not understood by the student body. Listening means a lecturer should have the capability of being a good listener when the student submits an opinion in the discussion or criticism of its student gained about teaching and learning.²¹

Unlike other basic science lessons, such as biochemistry and physiology, teaching anatomy needs a particular method of teaching and appropriate tools. These tools include a cadaver, human body atlases, and educational movies and slides.²⁵

Conclusion

The level of knowledge of the structure and topography of the organ among the medical student level IV is average.

Conflict of Interest

All authors stated that there no conflict of interest in this study.

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References

1. Association of Southeast Asian Nations. Cebu Declaration on the Acceleration of the Establishment of an ASEAN Community by 2015 [Internet]. Jakarta: ASEAN; 2012 [cited 2018 September 25]. Available from: <https://asean.org/cebu-declaration-on-the-acceleration-of-the-establishment-of-an-asean-community-by-2015>.
2. Undang-Undang Republik Indonesia Nomor 20 Tahun 2013 tentang Pendidikan Kedokteran.
3. Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan Nasional. Standar Kompetensi Pendidikan Kedokteran Dasar Indonesia (KIPDI III). Pedoman Nasional Penyusunan Kurikulum Berbasis Kompetensi Untuk Fakultas Kedokteran/Program Studi Kedokteran Dasar di Indonesia. Jakarta: Kementerian Pendidikan Nasional; 2005.
4. Utami MS. Daftar fakultas kedokteran terbaik di Indonesia. 2018 May 29 [cited 2018 September 25]. In: ban-pt-universitas [Internet]. Available from: <https://www.ban-pt-universitas.com/2018/05/daftar-fakultas-kedokteran-terbaik-di-indonesia-2018.html>.
5. Fakultas Kedokteran Universitas Islam Bandung. Pedoman akademik program pendidikan Fakultas Kedokteran Universitas Islam Bandung. Bandung: Fakultas Kedokteran Universitas Islam Bandung; 2018.
6. Cho MJ, Hwang YI. Students' perception of anatomy education at a Korean medical college with respect to time and contents. *Anat Cell Biol*. 2013;46(2):157–62.
7. Bergman EM, van der Vleuten CPM, Scherpbier AJJA. Why don't they know enough about anatomy? A narrative review. *Med Teach*. 2011;33(5):403–9.
8. Moore KL, Dalley AF, Agur AMR. Clinically oriented anatomy. 6th Edition. Philadelphia: Lippincott Williams & Wilkins; 2007.
9. Munawaroh S, Kartikasari MND, Hermasari BK. Konsensus pakar anatomi Indonesia mengenai materi inti anatomi sistem pencernaan. *J Biomedik*. 2018;10(1):1–8.
10. Papa V, Vaccarezza M. Teaching anatomy in the XXI century: new aspects and pitfalls. *ScientificWorldJournal*. 2013;2013:310348.
11. Munawaroh S. Penggunaan AC/ID dan active learning dalam pembelajaran anatomi dalam large group. *JPKI*. 2015;4(1):7–14.
12. Kim DH, Shin DH, Hwang YI. Effect of alternate dissection on anatomy learning. *Anat Cell Biol*. 2019;52(1):69–75.
13. Shastrakar R, Nakhate M. Evaluation of teaching methods in anatomy: a study on

- first year medical students. *Indian J Clin Anat Physiol.* 2019;6(3):295–8.
14. Leung BC, Williams M, Horton C, Cosker TDA. Modernising anatomy teaching: which resources do students rely on? *J Med Educ Curric Dev.* 2020;7:2382120520955156.
 15. Yusantaraputera, Yanwirasti, Abdiana. Gambaran pengetahuan dan sikap mahasiswa FK Universitas Andalas tentang rokok. *JKA.* 2014;3(3):499–505.
 16. Bergman EM, de Bruin AB, Herrler A, Verheijen IW, Scherpbier AJ, van der Vleuten CPM. Students' perceptions of anatomy across the undergraduate problem-based learning medical curriculum: a phenomenographical study. *BMC Med Educ.* 2013;13:152.
 17. Lieu RM, Gutierrez A, Shaffer JF. Student perceived difficulties in learning organ systems in an undergraduate human anatomy course. *HAPS Educator.* 2018;22(1):84–92.
 18. Nayak SB, Mishra S, George BM, Kumar N. Student project in anatomy (SPA)-making the first year medical students responsible and creative. *J Clin Diagn Res.* 2016;10(9):JC10–2.
 19. Lombardi SA, Hicks RE, Thompson KV, Marbach-Ad G. Are all hands-on activities equally effective? Effect of using plastic models, organ dissections, and virtual dissections on student learning and perceptions. *Adv Physiol Educ.* 2014;38(1):80–6.
 20. Musil V, Blankova A, Baca V. A plea for an extension of the anatomical nomenclature: the locomotor system. *Bosn J Basic Med Sci.* 2018;18(2):117–25.
 21. Qoyim M. Pengaruh komunikasi interpersonal antara dosen dan mahasiswa terhadap motivasi belajar dan prestasi akademik mahasiswa Politeknik Indonusa Surakarta. *J Ikon.* 2017;1(5):80–9.
 22. Syardiansyah. Hubungan motivasi belajar dan minat belajar terhadap prestasi belajar mahasiswa mata kuliah pengantar manajemen (studi kasus mahasiswa tingkat 1 EKM A semester II). *JMK.* 2016;5(1):440–8.
 23. Fadhillah TN, Handayani DE, Rofian. Analisis pola asuh orang tua terhadap motivasi belajar siswa. *JP2.* 2019;2(2):249–55.
 24. Charkhat Gorgich EA, Sarbishegi M, Barfroshan S, Abedi A. Medical students knowledge about clinical importance and effective teaching methods of anatomy. *Shiraz E-Med J.* 2017;18(12):e14316.
 25. Gole RA, Meshram P, Hattangdi S. Changes in perception about anatomy subject after 1st year of medical course. *IJBAMR.* 2015;4(4):453–7.