



Applied anatomy, today's requirement for clinical medicine courses

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Abstract: Anatomy as an indispensable part of the medical curricula, offering impeccable knowledge, prepares the students to enter the practical atmosphere. The aim of this study was to evaluate the clinical application of anatomy courses of the medical students in Zanjan University of Medical Sciences. This cross-sectional study was conducted in 2015 with census sampling on all clinical students (trainees and interns). To collect feedback from students, the questionnaire designed by researchers was used. The Likert rating scale of very high, high, medium, low, and very low was considered and scores of 5 (very high) to 1 (very low) were applied. Data were analyzed by SPSS software. Among the courses of anatomy, trunk anatomy has the greatest impact on clinical courses of medical students ($P < 0.001$). Subjects of muscular system, lymphatic system, vascular system, and nervous system were of significant clinical application during clinical periods; however, no significant clinical application observed for skeletal system ($P < 0.05$). Teaching clinical tips by professors can help improve the performance of medical students in clinical education. In addition, using three-dimensional anatomical software is suggested as well.

Key words: Anatomy, Teaching, Clinical medicine

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Introduction

In medical terms, basic sciences are part of clinical sciences and clinical sciences are a minor part of the basic sciences. These two have been integrated in such a way that they cannot be separated [1]. Education program for physicians includes these courses: general, basic sciences, semiotics and physiopathology, internship and training. Promotion to the higher levels is on the condition of passing all the courses of basic sciences and being accepted in the final exam of the

courses [1, 2].

Due to the central role of anatomy, development of medical knowledge and reaching to new horizons is not possible without relying on anatomy. Therefore, learning anatomy as a basis for medical sciences (basic and clinical) is inevitable. Teaching the students the basic medical terminology, anatomy is not considered a significant course for students because it reminds them of bones and dissection of a cadaver which are not alive and of little value. For this reason, many medical students have a negative attitude toward anatomy course [3].

Anatomy as a branch of biology and medical sciences is the first cornerstone of medical sciences which has tremendously progressed through recent years. Anatomy is a course in which students try to understand the detailed structures of the body, their function, and their relationship to each other. Research has shown that the use of advanced organizers makes the courses more significant and leads to better learn-

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ing and motivation of learners. Advanced organizers such as a practical course before a theoretical one may influence students' learning, facilitate learning, and also increase their interests in the subject [4]. Providing a perfect knowledge of human anatomy for medical students prepares them to enter the practical fields of this course. Anatomy is not only one of the major courses of medicine, but also helps in the development of specialization in medicine [5].

Not only anatomy deals with the study of structure and morphology, but also it has a long history in which anatomists play the role of geographers of the body [6]. Anatomists are faced with challenges like limited periods of the course and limited references [7]. Due to massive amounts of scientific terms and identifying the location of organs and their adjacencies, learning anatomy needs a high imagination ability and a strong memory [8, 9]. Failure of students in memorizing all the material of the course leads to their lower motivation in learning and their failure in putting those learned materials into practice [4]. Sometimes anatomists are criticized for paying too much attention to details and it's been said these details can be the disincentive for learning the materials. Also, it's been declared that an appropriate background of the subject for memorizing and learning the scientific materials for a longer time is inevitable [9].

With regard to training and internship students who can assess their basic learnings in the clinical atmosphere, this study aimed to determine the application of anatomy course in achieving clinical objectives from the perspective of medical students.

Materials and Methods

This cross-sectional study was conducted with census sampling. The subjects included all clinical students (trainees and interns) of Zanjan University of Medical Sciences in 2015. To collect opinions, a researcher-designed questionnaire was used which included two parts: first, demographic information (age, sex, and grade of students) and second, questions related to the usage of different courses of anatomy in internship and training. Questionnaire validity and reliability were assessed by the opinion of three experts of anatomical sciences and Cronbach's alpha test, respectively. Cronbach's alpha for this questionnaire was 0.9. The Likert rating scale of very high, high, medium, low, and very low was applied to assessment questions. To describe the data, scores of 5 (very high) to 1 (very low) were considered. For data analysis,

SPSS statistical software ver. 21 (IBM Corp., Armonk, NY, USA) was used. To determine the distribution of the scores, Kolmogorov-Smirnov test and for further analysis one-way analysis of variance (ANOVA) with $P < 0.05$ was used.

Results

The participants in this study were 37% male and 63% female students. According to the questionnaire, data were analyzed based on three variables of age, sex and students' grades (trainees or interns). According to Kolmogorov-Smirnov (K-S), the distribution of scores was normal.

To investigate the role of age during clinical courses, subjects were divided into three categories: A, less than 23 years ($n=19$); B, between 23 and 25 years ($n=52$); and C, more than 25 years ($n=29$).

The mean scores showed significant differences between group A compared to groups B and C ($P < 0.001$). However, there was no significant difference between groups B and C ($P < 0.05$) (Table 1).

To investigate the role of gender and students' grades in anatomy application during clinical courses, the independent samples *t* test was used. According to this test, the scores of each question based on gender between the two groups (interns and trainees) were not statistically significant. On the other hand, the scores of the students' grades were significant ($P < 0.05$).

From the viewpoint of medical students, in assessing the role of the trunk in anatomy application during clinical courses, the significant difference was observed between the interns and trainees ($P < 0.001$). Mean scores of the interns were higher than the trainees. It was also true about the limbs, head and neck, and neuroanatomy ($P < 0.05$) (Fig. 1).

In assessing the role of subjects taught in anatomy such as skeletal system, muscular system, studying the viscera, circular system, and lymphatic system in anatomy application during clinical courses from the viewpoint of medical stu-

Table 1. Role of age in the application of anatomy in clinical medical courses

| Category | Age (yr) | No. | Mean±SEM |
|----------|----------|-----|-------------------------|
| A | <23 | 19 | 3.1±0.11 |
| B | 23-25 | 52 | 3.49±0.05 ^{a)} |
| C | >25 | 29 | 3.54±0.04 ^{b)} |

Values are presented as mean±SEM. ^{a), b)}The mean scores showed significant differences between group A compared to groups B and C ($P < 0.001$). There was no significant difference between groups B and C ($P < 0.05$).

dents, scores were significant between the interns and trainees with the highest significance in trunk and lymphatic system anatomy ($P<0.001$) and lower significance in skeletal system, muscular system, and studying the viscera ($P<0.05$). Teaching clinical points seemed to be more important for the interns, showing a significant difference between these two groups ($P<0.001$) (Table 2, Fig. 2). Moulage, cadaver, and non-translated original references were not of different values between interns and trainees. However, using translated and compiled references were of different values between these two groups ($P<0.01$). Interns also preferred the multi-reference approach in comparison to trainees ($P<0.001$). The ability of the professor to present, his approach towards teaching, pamphlet, the multi-professors approach for teaching, PowerPoints and video projectors, and group tasks were not of significant value between interns and trainees. Strict teaching approach seemed to be important for trainees in comparison to interns ($P\leq 0.05$) (Table 2).

Discussion

Anatomy is a multi-dimensional subject in which students

must learn details of the body structures and functions in the form of theory and practice, and recognize relationships between organs [4]. Better recognition of these associations will help students in understanding the clinical points. For teaching all the details and communications, anatomists confront challenges such as limited time and high volume content [7]. Since students get familiar with basic and seemingly difficult medical terms for the first time in anatomy, they have a negative attitude towards this course [3]. According to the role of anatomy in better recognition of clinical issues, anatomists can improve knowledge, attitude, and skills of medical students [10]. Considering that training and internship students can assess the usage of their basic sciences knowledge in medical clinical issues, this study was conducted to determine the viewpoints of clinical students of Zanjan University of Medical Sciences on the use of anatomy course in achieving clinical objectives.

Results of this study showed that the trunk anatomy has the highest impact on clinical medicine courses; nevertheless, the limbs anatomy has the least impact in medical clinical courses. Also, the results showed the effective role of moulage, PowerPoint presentations, and professors' methods of teaching and teaching clinical notes in medical clinical courses.

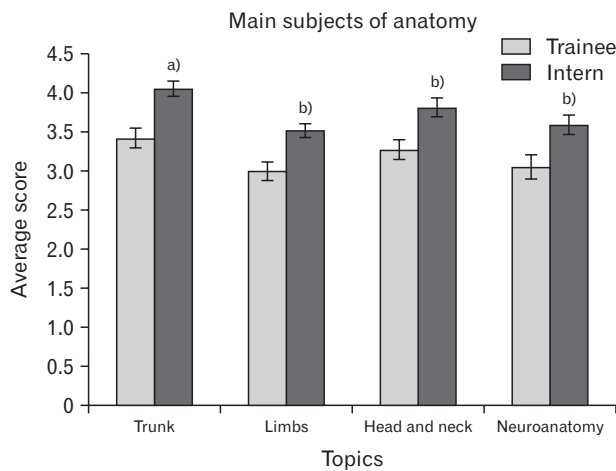


Fig. 1. Average score of trainees and interns on main subjects of anatomy. Values are presented as mean±SEM. ^{a)}Role of the trunk in anatomy application during clinical courses ($P<0.001$). ^{b)}Role of limbs, head and neck, and neuroanatomy in anatomy application during clinical courses ($P<0.05$).

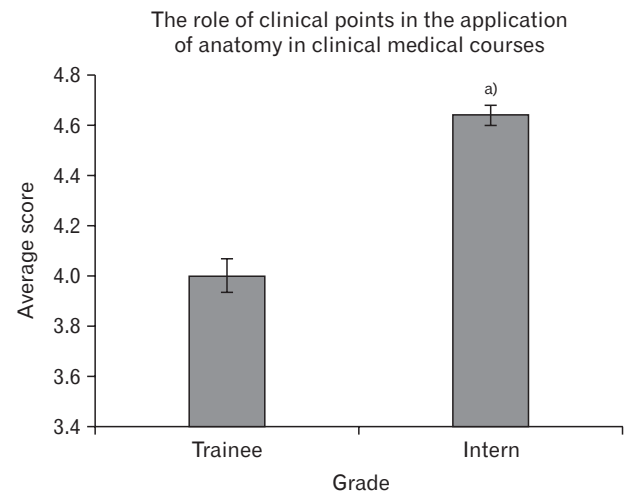


Fig. 2. Average score of trainees and interns on the role of clinical points. Values are presented as mean±SEM. ^{a)}Clinical points showed a significant difference between these two groups ($P<0.001$).

Table 2. Role of moulage, cadaver, PowerPoint, and teacher's ability to present in the application of anatomy in clinical medical courses

| | Moulage | | Cadaver | | PowerPoint | | Teachers ability to present | |
|---------------|---------|---------|---------|----------|------------|----------|-----------------------------|----------|
| | Trainee | Intern | Trainee | Intern | Trainee | Intern | Trainee | Intern |
| Average score | 4.1±0.1 | 3.9±0.1 | 3.8±0.0 | 3.92±0.1 | 3.98±0.1 | 4.18±0.0 | 4.4±0.1 | 4.28±0.1 |

Values are presented as mean±SEM.

However, application of moulage, cadaver, PowerPoint and professors' methods of teaching in clinical courses was not significant between students and interns groups.

The results of Pourghasem and Sum [4] showed that the trunk anatomy has the greatest impact on medical clinical courses. These results are in line with results of the Shariati et al. [1] who introduced the trunk anatomy as the most functional anatomy in clinical courses. However, in their study, trainees and interns declared the head and neck and neuro-anatomy as the least functional subjects in clinical courses, respectively. The reason of this difference can be their different experiences [1]. In this study, both training and internship students have declared limbs anatomy has little application in clinical medicine courses, it is also true in Pourghasem and Sum's study [4]. The reason for this difference may be due to the type of teaching, different sources of basic sciences and practical experience in different clinical courses.

Mehralizadeh et al. [8] have declared the effective application of moulage in clinical courses. Our results are consistent with theirs. In this study, students declared that moulage is more effective than the cadaver, although there is no significant difference between trainees and interns. Other studies have pointed out that learning anatomy with the help of cadaver has little to do with its applications in physical examination and is not a good alternative to the use of live specimens and clinical application of anatomy in education [11]. According to this study, both groups of trainees and interns have considered the teaching method effective; therefore, teaching method in practical courses (moulage and cadaver) can be important in their application in clinical medical courses. Teaching the methods vary at different universities in the world [12-16] and due to the differences between teaching methods there is no consensus [16].

The use of teaching aid tools leads to an increase in the students' passion for learning [17]. Results of this study showed that interns in comparison to trainees have considered the role of PowerPoint slides more effective in clinical medical courses. This result is in line with the results of Mehralizadeh et al. [8]. These results indicate the important role of educational facilities such as PowerPoint and video projection in better learning of anatomy and its application in clinical medical courses.

Teaching clinical points can play an effective role in preparing medical students for clinical courses. The present study confirms the results of Mehralizadeh et al. [8] in which teaching clinical points in the basic sciences course can be ef-

fective in the application of this lesson in the clinical medical courses. Although in this study interns consider the role of teaching clinical points in clinical medical course more important than trainees. This difference may be due to different experiences in clinical courses.

According to the results of this study teaching clinical points in basic sciences seems to be more important for students of medical clinical courses. Furthermore, reviewing the anatomical subjects before clinical courses can contribute to the function of anatomy in clinical courses. Since PowerPoint slides had a positive impact on the clinical courses, use of new training methods in the field of anatomy and anatomical sciences, such as the use of three-dimensional software seems to be necessary.

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