

Attitude of Medical Students Toward the Medical Basic Sciences in General Medicine

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Article Info	ABSTRACT
Article type: Original article	Introduction: Medical basic sciences are presented in the preclinical stage of the curriculum of medicine. The role of basic sciences in medicine has been controversial during the time. The purpose of this study was to investigate the attitude of medical students about the basic medical sciences.
Article History: Received: Sep. 07, 2025 Revised: Oct. 12, 2025 Accepted: Nov. 21, 2025 Published Online: Dec. 02, 2025	Materials & Methods: This was a cross-sectional study carried out in 2024 at Ilam University of Medical Sciences. The Researchers developed a questionnaire that covered different aspects of medical basic sciences. 240 medical students filled the questionnaire according to their individual attitude towards the questions. Data were compared between preclinical versus clinical students and high GPA students versus low GPA students using the SPSS 16 software. P value was less than 0.05.
 Correspondence to: Yousef Mohamadi Department of Anatomy, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran	Results: Most of the students believed that anatomy, physiology and professional language subjects are highly important. Moreover, most of the students believed that the volume of content is much in parasitology and epidemiology lessons, and is too much in biochemistry and bacteriology lessons. Most of the students showed a positive attitude toward the practical classes. There were no significant differences between the study groups about the importance of anatomy, physiology, histology and specialized language, the content volume of anatomy, physiology, parasitology, virology, professional language and epidemiology, the effectiveness of practical classes ($p > 0.05$). However, the students in different groups showed a significantly different attitude toward the other questions ($p < 0.05$).
Email: yosef.1365@yahoo.com	Conclusion: It can be concluded that medical basic sciences stage needs revision and the results of this study are useful in a new educational planning.
	Keywords: Medical basic sciences, medical students, attitude, medicine

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Introduction

The medical basic sciences are essential in medicine and required for medical students to understand the clinical concepts. The basic sciences stage in medicine is an opportunity to prepare and interest students in continuing their education in different medical specializations. Medical students use the information acquired in this course to solve clinical problems and make clinical decisions [1]. Despite this, general physicians are not efficient enough to remember methods and apply many of the medical basic sciences in the clinical course. Inconsistency in the appropriate and timely presentation of courses complicates this problem [2]. Traditional medical education does not place much emphasis on the application of basic sciences in the clinic, and on the other hand, medical students must base their clinical sciences on the knowledge they have acquired in basic sciences course [3]. Trying to put theoretical subjects of medical basic sciences into apply will play an important role in increasing the motivation and interest of students in the basic sciences [4]. The lack of connection between basic sciences courses and clinical courses and dividing medical training into preclinical and clinical stages have caused dissatisfaction among teachers and students [5]. Over time, critics have begun to downplay the role of basic science in favor of other aspects of medical education [6].

The core of educational activity of institutions is their curriculum. If the curriculum is not efficient and of appropriate quality, it will not only waste students' time, but also waste university money, energy, and capital, and will not achieve the desired results [7]. Making changes in curriculum planning towards implementing responsive education in order to empower learners to respond to social needs [8, 9]. It can be achieved by integrated curricula, in order to better utilize basic science in clinical medicine [10] and emerging technology (e.g., artificial intelligence for adaptive learning, virtual simulation, and telemedicine) for transformative education and medical education [11]. Medical education has

changed and will change in response to scientific advances and the needs of society. However, the desire for reformation must be done with an appropriate approach to avoid unintended consequences [12]. Given that students are one side of the teaching-learning process in medical education, it is important to evaluate their opinions and attitude in order to achieve an efficient and optimal educational program. Therefore, the present study was conducted to evaluate the attitude of medical students on the importance and place of the medical basic sciences in the training an accomplished general physician.

Materials and methods

This cross-sectional study was performed in 2024 at Ilam university of medical sciences. It was approved by Ethics Committee in Biological Researches (IR.MEDILAM.REC.1401.075). The participants were 240 students that were studying in general medicine.

A questionnaire was designed by researchers and used for data collection. First, an initial questionnaire that considered the various aspects of the medical basic sciences was prepared. Then, for validation, the questionnaire was evaluated by four experts. According to their point of view, the questionnaire was developed. In addition, 10 students filled the questionnaire twice in order to check the reliability of the questions. The questions covered different aspects of medical basic sciences including the length of the courses, teaching methods, teaching environment, educational programs, student evaluation, clinical importance of the lessons, the volume of contents and the clinically usefulness of practical courses. The subjects included in the questionnaire were anatomy, physiology, histology, microbiology, biochemistry, bacteriology, parasitology, virology, specialized language, and epidemiology.

Data analysis was done by the SPSS software, version 16. Data were compared between the groups: between the preclinical versus clinical students

firstly, and then between high GPA students versus low GPA students. The results were reported in percentage. the qualitative variables were compared between the groups by chi-square test at the significance level less than 0.05.

Results

A total of 240 medical students in preclinical and clinical courses (120 in each course) participated in this study. Among them, there were 110 students with the grade point average (GPA) over 16 and 130 students with the GPA equal to or less than 16.

Based on the descriptive statistics (table 1), most students believed that the duration of medical basic sciences course (41%) and physiopathology course (53.1%) is appropriate. A high percentage of students opposed the current method of student evaluation (45%). They mostly agreed with integration the basic sciences and clinical sciences in the curriculum (31.8%), and agreed with new student-centered teaching methods (31.9%). 52.3% of students believed that the hospital environment has a great effect on learning basic sciences. In addition, most students believed that basic sciences were not

presented in an organized and regular pattern and that the clinical application of basic sciences was not well explained (35.6% and 44.5%, respectively). Regarding to the importance of basic sciences and their helpfulness in understanding the clinical sciences, most students believed that anatomy (48.7%), physiology (51%), and specialized language (40.4%) are important, histology (39.1%), parasitology (34.9%), and virology (35%) are moderately important, and biochemistry (39.1%), bacteriology (34.9%), and epidemiology (35%) have low importance. About the volume of content of lessons, most students believed that the content is appropriate in anatomy (50.8%), physiology (54.6%), histology (48.7%), virology (45.3%), and specialized language (42.6%) lessons, is much in parasitology (38.1%), and epidemiology (37.2%) lessons, and is too much in biochemistry (49.2%), bacteriology (35.2%) lessons. Moreover, most students believed that practical classes have a great effect on understanding theoretical concepts (52.5%), but the time allocated to practical classes is low (41.2%). Also, 46.6% of students believed that the anatomy needs more practical classes. The next subject in this regard was physiology (28.9%).

Table 1. descriptive statistics

Variable	Most student's attitude
Duration of medical basic sciences course	Appropriate (41.6 %)
Duration of physiopathology course	Appropriate (53.1%)
Current method of student evaluation	Disagree (45%)
Basic and clinical sciences integration	Agree (31.8%)
Student-centered teaching methods	Agree (31.9%)
Effective educational environment	Hospital (52.3%)
Well-ordered presentation of subjects	Disagree (35.6%)
Clear explanation of clinical application of basic sciences	Disagree (44.5%)
Importance of lessons	High: anatomy (48.7%), physiology (51%), specialized language (40.4%)

	Moderate: histology (39.1%), parasitology (34.9%), virology (35%) Low: biochemistry (39.1%), bacteriology (34.9%), epidemiology (35%)
Contents of lessons	Appropriate: anatomy (50.8%), physiology (54.6%), histology (48.7%), virology (45.3%), specialized language (42.6%) Much: parasitology (38.1%), epidemiology (37.2%) Too much: biochemistry (49.2%), bacteriology (35.2%)
Practical classes	Importance: high (52.5%) Time: low (41.2%) More helpful for: anatomy (46.6%)

Statistical analysis of data in preclinical and clinical students' groups

Clinical students compared to preclinical students significantly thought that the length of the basic sciences period is long ($p = 0.01$). Significantly more clinical students disagreed the student evaluation methods compared to preclinical students ($p = 0.001$). Also, a lower percentage of clinical students compared to preclinical students significantly ($p < 0.1$) agreed with the vertical integration of basic sciences and clinical sciences courses. A significant difference also observed between two groups about new teaching methods ($p < 0.001$) as more preclinical students preferred new teaching methods. In response to the question of whether basic sciences subjects are presented in an organized way, there was a significant difference between the views of the students of two groups ($p < 0.5$) so that the preclinical students disagreed. It was found that most clinical students compared to preclinical students significantly underestimated the importance of biochemistry, bacteriology and parasitology ($p < 0.01$). On the other hand, most preclinical students compared to clinical students significantly underestimated the importance of epidemiology ($p = 0.001$). In general, the viewpoints of two groups about the volume of contents of lessons were significantly different ($p < 0.001$). However, in both groups, most students found the volumes of contents are appropriate. As an

exception, most of clinical students believed that the volume of the content in bacteriology subject is too much, which was significantly different from the perspective of preclinical students ($p < 0.5$). Other questions did not show a significant difference between the groups ($p > 0.05$).

Statistical analysis of data based on student grades

We compared the data between the student with GPA over 16 and the student with GPA equal to or less than 16 to see the effect of GPA on the student's viewpoint. The students of the two groups believed significantly different about the volume of content in virology and epidemiology subjects ($p < 0.05$). Most students with lower GPA believed that the volume of these subjects is appropriate, while most students with higher GPA believed that it is high. About the specialized language subject, despite the significant difference, students of both groups considered the volume of content is appropriate. There was no significant difference between the groups about the other questions ($p > 0.05$).

Discussion

The present study evaluated the attitude of medical students toward the medical basic sciences course, using a researcher-made questionnaire. In general, the results showed that students believed that duration of this period in medicine curriculum is appropriate. However, some changes in areas such as

teaching methods and student evaluation are demanded. Students believed that anatomy, physiology, and specialized language courses are very important and that the volume of content in these subjects is appropriate. Most students believed that practical classes are so helpful in understanding theoretical concepts and the time allocated to the practical classes is not enough. In addition, the results showed that level of education and GPA had a significant effect on the attitude of students toward some questions in the questionnaire.

Predicting and determining the educational needs is one of the most important and difficult steps of educational planning, because the educational efficiency and success of students depend critically on it. In the meantime, a very important part of this issue should be sought in a survey of students and recent graduates who are directly involved in the subject and are fully aware of the dimensions of the subject. At the beginning of the 20th century, medical education in the United States was at a critical stage. Major deficiencies in medical education led to release of the famous Flexner Report in 1910 in which he insisted on the necessity of university-based medical education. He believed that the medical curriculum should include medical basic sciences [13]. As a result, formal medical schools divided medical education into two preclinical and clinical courses. However, later, some studies reported inconsistency and dissatisfaction of professors and students with the preclinical course in the form of lack of integration with clinical courses, and complete separation of preclinical and clinical courses [5]. Most preclinical basic sciences were taught in a passive, lecture-based format by basic science professors without any attempt to place their teaching in a clinical context [14]. Over time, critics began to downplay the role of basic sciences in favor of other aspects of medical education [6]. However, others strongly defended the essential role of basic sciences. Based on research evidence, they insisted that basic sciences should remain an essential part of medical education [15, 16]. Although the future of medical basic sciences in

medical education is not clear, it seems basic sciences help medical students learn the logic and discipline necessary for lifelong problem-solving abilities, clinical reasoning skills, and critical analysis [17]. It seems that basic sciences remain an important part of medical education. However, a modification and an upgrade seem to be necessary to move curriculum towards the use of new technologies, creativity, innovation, and relevance to the clinic.

The results of the present study showed that the students believed that anatomy, physiology, and specialized language subjects are important in preparing for the clinical course. These findings were in line with the results obtained from previous studies about the anatomy and physiology subjects [18-20]. Regarding to specialized language, previous studies have mainly criticized the teaching methods and presentation of the subject, not its importance [21]. On the other hand, the volume of content presented in these courses was considered appropriate by students. Data analysis in different groups had no effect on this result. However, students' viewpoints about the volume of content have been reported in some studies contrary to the results of our study [18]. This indicates that these courses should be given more attention in basic science educational programs. In addition, according to the results of the present study, it seems that more attention should be given to practical classes and the hospital environment as factors affecting medical education. Khalili-Alafi et al. also reported that most medical professors believe that the hospital is a suitable and more effective learning environment compared to other environments [22].

Here, students' attitude on the use of modern educational methods was studied. In the past, teaching in the pre-clinical years focused on the transfer of biomedical principles and pure information. Today, teachers are responsible for presenting concepts with an emphasis on clinical relevance using active learning, critical thinking,

communication skills [23]. Problem-based learning methods could support these educational goals [24, 25]. Most of the students participating in our study agreed with the change in current educational methods towards student-centered teaching methods. This view was influenced by the students' educational level. Another issue examined related to the change in educational methods was the students' views on the vertical integration of basic science courses with clinical sciences courses, and most of the students agreed with this type of integration. Previous studies have shown that case-method teaching is a feasible method for promoting critical thinking in medical students and integrating basic concepts into clinical sciences [26]. Clinical cases-discussions have played a significant role in the medical education. These interactive teaching methods have been effective in the training professional physicians [27]. Problem-based learning, which has gained widespread acceptance in medical education, is a formal example of this educational approach that enhances students' skills, and professional competencies [28].

Rethinking the medical education curriculums is inevitable [29]. Medical education is currently undergoing a gradual but significant change. Part of this change is related to the reduction of basic science education time by shortening the preclinical period [30]. Statistics provided by Emanuel on American medical schools suggest that, given the capabilities of online education and the fact that in many schools, the majority of medical students no longer attend in-person preclinical classes, but rather watch the teaching of exemplary professors from around the world via the Internet, this educational method can be used for the preclinical years of medical education [29]. However, the results of our study do not support this claim. So that the majority of students considered the duration of the preclinical course to be appropriate. Also, most students chose the hospital environment as the most suitable educational environment and only a small percentage of students considered the virtual classroom to be appropriate for educating the basic sciences. On the other hand, the

experience of the profound effects of the coronavirus disease 2019 (COVID-19) on medical education may forever change the way future physicians are educated. In response to COVID-19, medical schools have rapidly shifted pre-residency curricula, including basic sciences, to online formats. Exams were also moved to online settings. Educational consequences and effects of these changes require further evaluation [31]. Medical schools have been working on changing education for decades. This has been done by eliminating or reducing lecture-based instruction, using technology to replace or augment anatomy and laboratories, implementing team and active learning, and promoting individual and interprofessional education [32, 33]. Many schools have reduced the basic sciences curriculum while integrating clinical medicine into this course and reviewing the basic sciences in the clinical course [29].

Conclusion

According to the results obtained from the study and analysis of students' perspectives, it can be concluded that the way basic medical science courses are presented requires some changes in order to improve students' basic knowledge and ability to apply it in the clinic.

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Ethics approval

This study was approved by Ethics Committee in Biological Researches (IR.MEDILAM.REC.1401.075).

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Conflict of interest

There is no conflict of interest between authors.

Authors' contributions

- Conceptualization: Yousef Mohamadi
- Methodology: Yousef Mohamadi, Reza Pakzad
- Data collection: Esmaeil Ghaderi
- Formal analysis: Reza Pakzad
- Supervision: deputy of research and technology at Ilam university of medical sciences
- Project administration: Yousef Mohamadi
- Writing - original draft: Yousef Mohamadi
- Writing – review, editing and approving: All authors.

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