Perception and Significance of Basic Sciences for Clinical Studies

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Abstract

Background: Faculty of Medicine and Health sciences at University of Kassala, Sudan was established 1990. It adopts the traditional curricula, which implemented in preclinical (basic sciences) and clinical phases. This study was held to explore students' perception and attitudes towards the basic sciences.

Methods: A descriptive cross-sectional study was conducted during April- August 2017 among 251 medical students. Self administered questionnaire was used to collect data. It was collected and analyzed using SPSS 16.0.

Results: A total of 251 of participants in different phases of education in faculty of medicine and health sciences were included in the study; preclinical 116 (46.2%), 113 clinical (45.0%), and 22 (8.8%) were in internship. 95 (37.8 %) were males and 156 (62.2%) were females. The study revealed that physiology was the most preferable subject. Students' satisfaction to syllabus for anatomy, physiology and biochemistry was 61.4%, 43%, and 28.7%   respectively. However, 46.6% of students spent a long time to understand biochemistry and 33.1% considered it as overloaded syllabus. Participants showed poor ability to link between theoretical and practical work in case of biochemistry (26.7%), where as anatomy and physiology were represented by 76.9% and 42.2% respectively. Less than half of students were able to integrate the subjects of basic sciences and basic with clinical sciences.

Conclusion: In this study, the students determined the difficulties of recalling of information, poor integration between basic and clinical sciences and even integration within the subject. Development of integrated curriculum is necessary to improve the quality of education.

Introduction

Medical students build their clinical knowledge based on basic science knowledge previously acquired in past years [1]. There is growing worry among medical educators that traditional programs for teaching medical students have not provided better results for learning [2]. In the traditional system of medical education, basic subjects (anatomy, biochemistry and physiology) are taught through educational lectures, lessons and practical classes. This system is a teacher centered with minimal active participation of students [3]. Many undergraduate students inform unofficially that their memory of basic medical science courses is lower than expected, and that the content of these courses does not seem relevant to their clinical work or subsequent studies [4]. Moreover, students become increasingly passive in their views on basic science courses as they progress through medical education [5].

These opinions are important as the purpose of education is defeated if the knowledge gained becomes inert and inaccessible. Generally, medical students in conventional programs use previously learned basic sciences concepts to build their clinical knowledge. It has been observed that basic science knowledge learned in a clinical context is better comprehended and more easily applied by the students. The previous studies done in a medical school of Nepal and India have found overall positive opinion towards the basic sciences among medical students [5,6].

In contrary other studies carried in the Netherland and Saudi Arabia have found that students became increasingly negative in their opinions about basic science courses as they progressed through their medical education [2,7].

Little is known about the attitudes and perception of medical students toward basic sciences. Monitoring the attitudes and perception of medical students throughout their course may be relevant to provide guidelines to the educational planners for better integration of basic sciences with clinical subjects so that students can apply their knowledge unanimously to explain the clinical conditions. Therefore, this study was planned with the objective of assessing the students' attitudes and perception toward learning basic sciences.

Materials and Methods

Study Design

Descriptive cross sectional study was conducted during May to August 2017 at University of Kassala, Kassala state, eastern Sudan. The study was held among students from faculty of medicine and health sciences and those who are in internship at Kassala teaching Hospital, Kassala State. The study was carried to investigate perception and attitudes towards basic sciences.

Data Collection

Data was collected using a designed questionnaire. A total of 251 questionnaires were distributed among students randomly after taking their consent for participation in this study. The questionnaire collected information on students' academic year and their perceptions of the following characteristic of basic science courses: Syllabus, overload, information recall, practical integration of knowledge, necessity of basic science subjects for clinical knowledge and application in clinical practice. All opinions were rated using a positive-point Likert scale, which ranges from "strongly disagree" to "strongly agree." All opinion levels were analyzed. Chi-square test was performed on categorical variables and significance was considered at $P<.05$

Data Analysis

Data was analyzed by statistical package for social science (SPSS), and then displayed by tables and histograms.

Results

The study included 251 participants; 95 (37.8 %) were males and 156 (62.2%) were female. Among the enrolled group of study, 116 (46.2 %) were studying in preclinical phase and 113 (45%) were in clinical phase. The number of interns participating in the study was 22 represented (8.8 %) of all participants. One hundred and forty three (57%) out of 251 were scholarship awarded by ministry of higher education and scientific research, while 108 (43%) were self-financed.

Physiology was the most (54.6%) preferable subject, (46.6 %) of participants mentioned they spent a long time to understand biochemistry compared to other basic disciplines (Table 1; Fig 1).

Table 1. popular subject

Subject	Frequency	Percentage %
Anatomy	96	38.2
Physiology	137	54.6
Biochemistry	18	7.2

Table 2. Teaching methods satisfaction among participants

Subject/ satisfied	Strong agree	Agree	Neutral	Disagree	Strongly disagree
Anatomy	21.9%	19.1%	15.9%	18.3%	24.7%
Physiology	14.7%	23.5%	15.9%	26.7%	19.1%
Biochemistry	6.0%	21.5%	18.3%	21.9%	32.3%

Table 3. Reasons for attending laboratory regarding different subjects

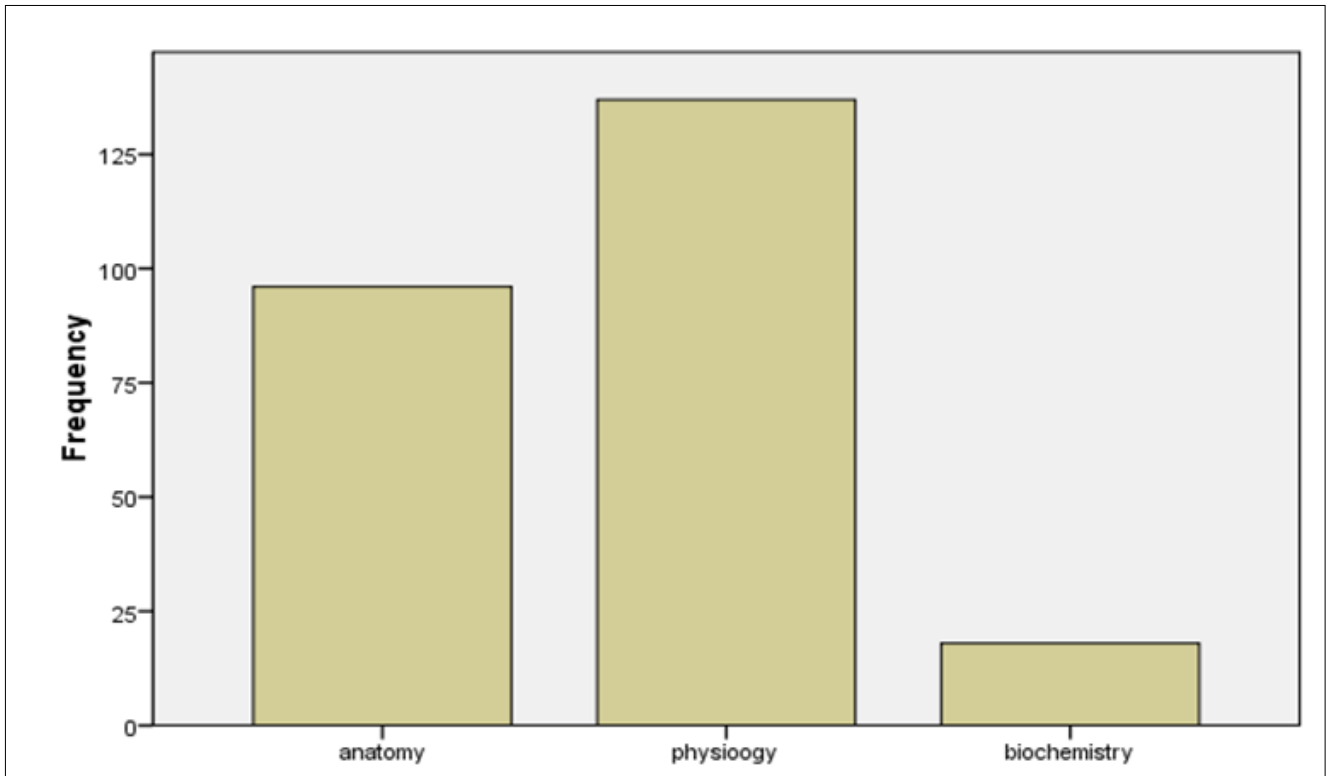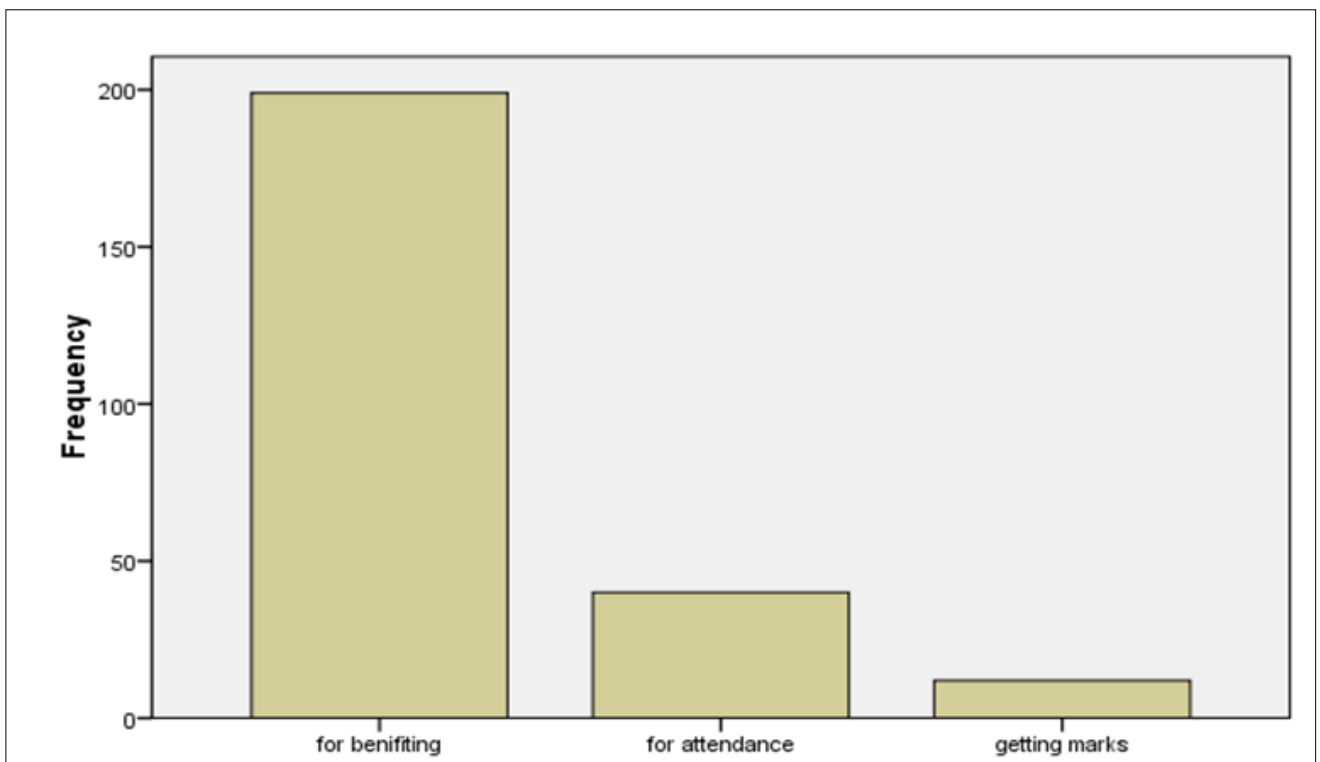| Reason	Anatomy	Physiology	Biochemistry
Knowledge & skills	79.3%	38.2%	25.5%
Attendance	15.9%	38.6%	50.2%
Marks	4.8%	23.1%	24.3%

Figure 1: Popular science

Figure 2: Reason for attending lab regarding anatomy

Curriculum of anatomy was considered satisfactory for 61.4% of participants, whereas biochemistry curriculum was considered extensive by 33.1%. Recalling of anatomy and physiology during clinical discussion was 72.5%, and 74.1% respectively. This percentage was 27.1% for biochemistry.

The traditional curriculum, which is basically, relies on lectures for information transfer, showed un-satisfaction among participants as shown in table [2]. Participants showed poor ability to link between theoretical and practical work in case of biochemistry 26.7%, whereas anatomy and physiology were represented by 76.9% and 42.2% respectively. Integration between different disciplines of basic sciences was reported by 44.6%. Similarly, 45.8%were able to integrate between basic and clinical sciences. Most of participants depend on references as source of information. However, different reasons were considered for their attendance to laboratory work; as shown in table [3]. Regarding the anatomy, the majority of students were found to attend the lab for benefits (Fig. 2). Only 25.5% of participants attended the biochemistry laboratory for getting knowledge. Coverage of laboratory work to lectures was mentioned by only 13.5% of participants; and only 18.7% were able to conduct experiments in the lab by themselves. Significant correlation (p <0.05) was reported in different groups of participants regarding satisfaction of teaching methods for three disciplines, reasons for attending dissection room for getting information and skills where 100% of those in internship period, recalling for physiological information during clinical period. Also, a significant correlation was appearing in integration of theory and practical work in biochemistry discipline.

Discussion

The subject is very important as this issue has not been addressed in Sudan until now, which is very important as administrators are considering changing curricula in many colleges of medicine, and establishing other new areas of study.

The results of this study suggest that good clinical knowledge can't be obtained without a full understanding of its background in basic sciences.

Our findings support the fact that clinical year students have suffered a lot in clinical questions. This finding confirms that knowledge of basic sciences has a direct impact on the successful response to clinical questions.

The study found that physiology is the most preferred science because of the understanding of subjects, and its clarity in the curriculum. The study showed that students take a long time to understand biochemistry compared with other basic sciences because of interference in each chapter with another leading to confusion and mixing of subjects with others. It was difficult to differentiate from other subjects through the need to save every part of the curriculum; and this is very difficult for the student.

However, anatomy is one of the best basic sciences because it connects the practical aspect with theory, which benefits students, especially in surgery.

Therefore, the well-organized curriculum can facilitate review and aggressive individual learning habits of key concepts as more advanced courses and clinical experiences explicitly and intentionally will use and build on previous learning. Although some studies of clinical reasoning showed little evidence that clinicians used basic science in routine diagnosis [8], it was also noted that knowledge of basic science may have value in clinical diagnosis by helping students recall or reconstruct the relationship between features and diagnosis. Due to its conceptual coherence, basic science was more memorable and helped students to reconstruct the features of individual disease categories after the initial symptom lists had been forgotten [9].

It is important to point out that strong long-term memory, as previous research has noted, is directly associated with over-learning in the initial phase and the proper distributing and renewal of study matter over longer intervals of time [10].

Previous research also found that the focus on meaning and understanding rather than memorization, along with adequate time to learn (especially of complex material) and deliberate effective engagement with tasks (practice) are coarse elements that promote initial learning [11].

The difference between second and clinical years' students may also be partially related to the importance attributed to basic science facts by the two student populations. It was shown that senior students,

as opposed to junior students, validated the learning objectives of basic sciences as less relevant to clinical practice, while biochemistry basic items were considered to be more irrelevant [12].

A finding that clinical knowledge is not necessarily rooted in understanding basic processes calls for future research efforts that should aim at exploring elements necessary for successful performance of medical tasks [13]. It should also include the factors that influence the connection between pre-clinical and clinical knowledge, such as different types of medical school curricula, various methods of teaching and study materials, as well as students' awareness of the importance of basic sciences. The aim should be a collaborative and interdepartmental development of basic science medical curriculum, created by both science and clinical faculty members, which would integrate more clinical knowledge into pre-clinical years [14].

Although the basic and clinical knowledge scores among the 4th clinical year's students were not statistically different, the basic science score was < 2nd year students, but > 3rd and 5th year students' scores. The clinical students' scores in the clinical questions were only > 2nd year but < 3rd and th5 year students. The insignificant difference between basic and clinical question scores may be due to the presence of individual variations and the increase in the subject's number where they were studying surgery, pediatrics, orthopedics, psychiatry, ophthalmology, otolaryngology, and community medicine, which require much effort. We did not include general surgery background knowledge in the clinical questions, so they may have gradually forgotten basic knowledge and the academic performance for these student was different than others in the studied sample where their GPA was the lowest level in comparison to the others students, and that is in agreement with conclusions of other previous studies [12-14].

Medical schools must have an internal quality control system so that there is a very objective committee to evaluate and set forth educational standards expected to be attained by its students. As it has been discussed, written, and rewritten about the ultimate criteria, the educational effectiveness is correlated with instruction given, and is associated with

quality and care that will eventually be rendered to patients. Bligh [15] concluded that the basic medical subjects taught to students do not focus on correlation with clinical learning. Hegazy [16] emphasized the importance of such integration between basic and clinical sciences in medical education. He added that the recent advances in learning modalities such as simulation, videos and radiological imaging could assist the students in understanding the solid knowledge of basic science; and correlate them to the clinical field. Therefore, we agreed him regarding the importance of the clinical background for the medical staff performing teaching the basic medical sciences.

Conclusion

In this study, the students determined the difficulties of recalling of information poor integration between basic and clinical sciences, and even integration within the subject. Development of integrated curriculum is necessary to improve the quality of education.

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