

Challenges and Difficulties Associated with Physiology Learning in Undergraduate Medical Students in Integrated Curriculum

Challenges and
Difficulties with
Physiology
Learning in
Undergraduate

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ABSTRACT

Objective: To find out the difficulties and challenges associated with learning of Physiology in undergraduate medical students in integrated curriculum.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at the Ziauddin Medical College, Ziauddin University, July 2017 to June 2018.

Materials and Methods: The study participants included 1st, 2nd, 3rd year medical students. There were 147 MBBS students in this study. A questionnaire was distributed to each student. The questionnaire included 23 items from why is Physiology hard for students to learn? It included items related to subject, teaching and learning of Physiology. The medical students were asked to select a response for each item on likert scale from 1 to 5. The Physiology learning responses were compared between 1st, 2nd & 3rd MBBS students.

Results: The medical students thought that characteristics of discipline including well defined syllabus (90.7%), understanding of physiological phenomena (88.8%), and use of scientific terms (89.3%) were more important aspects. Regarding the teaching factors including integration (84%), use of active learning methods (81.7%), use of graphs and flow charts by teachers (80%), teachers' response to student questions (88.4) were found to be more important. In relation to student learning important factors was rote learning than understanding (92%), time commitment (83.6%), and not taking guidance from other students (80.4). The comparison was done between MBBS 1st 2nd and 3rd year medical students. A significant difference was found in factors including basic concepts (0.01), passing exams by using short books (0.01) and integration (0.002).

Conclusion: The medical students provided perspective regarding the difficulties in learning physiology and the reasons of these difficulties.

Key Words: Physiology, Teaching, Learning, Integrated Curriculum

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INTRODUCTION

In creating 21st century physicians, the primary goal is to educate future doctors who can completely incorporate the new sciences and technology into humane patient care¹.

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Currently many medical schools are designing innovative medical curricula in their bachelor programs². Many medical schools are progressing towards a more student centered approach to learning and assessment³. Integration is established as a vital educational strategy in medical education⁴. Integration promotes better retention of knowledge and the skill to execute basic science principles in the appropriate clinical context⁵.

During first two years of medical school, basic science content provides an essential foundation for clinical experiences⁶. Basic science concepts forms schema for clinical reasoning and therefore they work as building blocks for any clinical decision making⁷. This knowledge helps students to rebuild the relationship between features and diagnosis of disease⁸. Recently many medical schools have started to modify their preclinical curricula to indicate the importance of basic science to practice⁹. The coherence between basic and clinical science is provided by early patient contact in

the first year simultaneous with basic science teaching and by clinical principles mingled into basic science courses¹⁰. Understanding the applicability of basic science education in the establishment of patient assessment, diagnosis, and treatment is critically important to competent medical practice¹¹.

Physiology is one of the basic science disciplines taught at undergraduate level in traditional & integrated curriculum, in medical, dental and other health professional education¹². Its importance lies in its application in clinical practice¹³. The close association of physiology with clinical medicine is highlighted in the preclinical years, and also in hospital practice later¹⁴. Being one of the mandatory basic science disciplines, Physiology is also experiencing changing trends in teaching. Student centered learning methods have been found to be most helpful in concept building of physiological sciences¹⁴. As the knowledge of Physiology is the basis of good clinical practice, a questionnaire was designed to study the different aspects of Physiology learning. The objective of the study was to find out the difficulties and challenges associated with learning Physiology in undergraduate medical students in integrated curriculum.

MATERIALS AND METHODS

The study design was cross sectional. The study was conducted at Ziauddin Medical College. The study was conducted in 1st, 2nd and 3rd year medical students. There were 147 MBBS students in the study. The participants were selected by convenient sampling technique. The time duration of study was one year, from July 2017 to June 2018. The study was approved by Ethics review board of Ziauddin University. After getting the ethics approval, the participants were enrolled in the research study. Informed consent was obtained from each participant.

In order to study the challenges associated with Physiology learning, questionnaire was distributed to 1st, 2nd and 3rd year medical students. The questionnaire included 23 items from why is Physiology hard for students to learn? The students were asked to select a response for each item on likert scale from 1 to 5. The medical students provided their opinion about the difficulties in learning physiology and the reasons of these difficulties. The questionnaires were collected and the data was analyzed.

The data were analyzed using SPSS version 20. The results of all quantitative data were expressed as mean \pm SD. The comparison of qualitative data was expressed by Chi Square test. In all statistical analysis, only p-values \leq 0.05 were considered significant.

RESULTS

There were 147 MBBS students in the study. The mean age of students was 19.99 \pm 1.3 years (male 36% & female 64%).

Table I showed the cumulative percentage of items included in the questionnaire as marked by MBBS students. The medical students thought that characteristics of discipline including well defined syllabus (90.7%), understanding of physiological phenomena (88.8%), and use of scientific terms (89.3%) were more important aspects.

Table No. I: The cumulative percentage of Physiology learning responses of MBBS students

Q.No.	Option	Cumulative %tage
1.	A	73.3
	B	11.1
	C	15.6
2	A	87.9
	B	7.6
	C	4.5
3	A	80.9
	B	10.7
	C	8.4
4	A	74.2
	B	19.1
	C	6.7
5	A	89.3
	B	8
	C	2.7
6	A	84
	B	12
	C	4
7	A	90.7
	B	5.8
	C	3.6
8	A	92
	B	5.3
	C	2.7
9	A	83.6
	B	12.4
	C	4
10	A	71.1
	B	19.1
	C	9.8
11	A	38.2
	B	18.7
	C	43.1
12	A	88.8
	B	8.5
	C	2.7
13	A	51.6
	B	26.2
	C	22.2
14	A	44.9
	B	23.1
	C	32
15	A	80
	B	12.4
	C	7.6
16	A	79.6
	B	9.3
	C	11.1
17	A	75.1
	B	13.3

	C	11.6
18	A	57.3
	B	16.4
	C	26.2
19	A	88.4
	B	5.3
	C	6.2
20	A	89.8
	B	8
	C	1.8
21	A	81.7
	B	12.1
	C	6.2
22	A	80.4
	B	14.7
	C	4.4
23	A	40.9
	B	29.8
	C	29.3

Regarding the teaching factors including integration (84%), use of active learning methods (81.7%), use of

graphs and flow charts by teachers (80%), teachers' response to student questions (88.4) were found to be more important. In relation to student learning important factors was rote learning than understanding (92%), time commitment (83.6%), and not taking guidance from other students (80.4).

Table 2 showed the comparison of Physiology learning responses between 1st, 2nd and 3rd year MBBS. The frequency, percentage and chi square value of each item is mentioned in the table. Table II included items related to basic concepts, scientific terms, new researches in medical science, interaction between systems, well defined physiology syllabus, understanding physiology, commitment of time for learning physiology, importance of case study, passing physiology exams by short books, teaching physiology by giving concepts, correlating different topics, guiding students about learning resources, use of graphs & flow charts in teaching, integration of physiology teaching, covering large content in lecture, responding to student questions and use of active learning methods.

Table No.2: Comparison of Physiology learning between 1st, 2nd and 3rd year MBBS students

Q.No.	n	Year	Frequency			Percentage			Chi square
			A	B	C	A	B	C	
1	225	1	101	14	11	61.2	56	31.4	0.018
		2	29	4	8	17.6	16	22.9	
		3	35	7	16	21.2	28	45.7	
2	225	1	115	8	3	57.9	47.1	30	0.422
		2	35	3	3	17.8	17.6	30	
		3	48	6	4	24.4	45.3	40	
3	225	1	104	11	11	57.1	45.8	57.9	0.118
		2	30	9	2	16.5	37.5	10.5	
		3	48	4	6	26.4	16.7	31.6	
4	225	1	97	22	7	58.1	51.2	46.7	0.475
		2	28	11	2	16.8	25.6	13.3	
		3	42	10	6	25.1	23.3	40	
5	225	1	114	9	3	56.7	50	50	0.312
		2	39	2	0	19.4	11.1	0	
		3	48	7	3	23.9	38.9	50	
6	225	1	105	15	6	55.6	55.6	66.7	0.817
		2	33	6	2	17.5	22.2	22.2	
		3	51	6	1	27	22.2	11.1	
7	225	1	114	8	4	55.9	61.5	50	0.937
		2	38	2	1	18.6	15.4	12.5	
		3	52	3	3	25.5	23.1	37.5	
8	225	1	118	6	2	57	50	33.3	0.664
		2	37	3	1	17.9	25	16.7	
		3	52	3	3	25.1	25	50	
9	225	1	111	12	3	59	42.9	33.3	0.067
		2	31	9	1	16.5	32.1	11.1	
		3	46	7	5	24.5	25	55.6	
10	225	1	90	24	12	56.2	55.8	54.5	0.313
		2	32	8	1	20	18.6	4.5	
		3	38	11	9	23.8	25.6	41	
11	225	1	37	25	64	43	59.5	66	0.019
		2	23	5	13	26.7	11.9	13.4	
		3	26	12	20	30.2	28.6	20.6	
12	225	1	114	11	2	56.8	57.9	33.3	0.694

		2	35	4	1	17.6	21.1	16.7	
		3	51	4	3	25.6	21.1	50	
13	225	1	63	34	29	54.3	57.6	58	0.979
		2	22	11	8	19	18.6	16	
		3	31	14	13	26.7	23.7	26	
14	225	1	49	30	47	48.5	57.7	65.3	0.259
		2	20	10	11	19.8	19.2	15.3	
		3	32	12	14	31.7	23.1	19.4	
15	225	1	102	14	10	56.7	50	58.8	0.898
		2	31	7	3	17.2	25	17.6	
		3	47	7	4	26.1	25	23.5	
16	225	1	102	8	16	57	38.1	64	0.296
		2	32	4	5	17.9	19	20	
		3	45	9	4	25.1	42.9	16	
17	225	1	91	18	17	53.8	60	65.4	0.125
		2	36	5	0	21.3	16.7	0	
		3	42	7	9	24.9	23.3	34.6	
18	225	1	59	23	44	45.7	62.2	74.6	0.002
		2	25	7	9	19.4	18.9	15.3	
		3	45	7	6	34.9	18.9	10.2	
19	225	1	106	10	10	53.3	83.3	71.4	0.139
		2	37	1	3	18.6	8.3	21.4	
		3	56	1	1	28.1	8.3	7.1	
20	225	1	115	10	1	56.9	55.6	25	0.081
		2	35	5	0	17.3	27.8	0	
		3	52	3	3	25.7	16.7	75	
21	225	1	100	15	11	54.1	55.6	78.6	0.372
		2	36	5	0	19.7	18.5	0	
		3	48	7	3	26.2	25.9	21.4	
22	225	1	105	16	4	58	48.5	40	0.516
		2	32	8	1	17.7	24.2	10	
		3	44	9	5	24.3	27.3	50	
23	225	1	45	40	41	48.9	59.7	62.1	0.2
		2	20	14	7	21.7	20.9	10.6	
		3	27	13	18	29.3	19.4	27.3	

DISCUSSION

In this study, challenges and difficulties associated with Physiology learning were studied. Table II showed comparison of Physiology learning responses between MBBS 1st, 2nd and 3rd years. There was a significant difference found in Item 1, 11 and 18. Item 1 was regarding knowledge of basic concepts of physics and chemistry. It is known that transfer, the capability to use something learned in one context in another context, is difficult, and this evidently contributes to students' lack of ability to use their prerequisite knowledge (chemistry and physics) in learning physiology. This is consistent with the study done by Michael¹⁵. He asked the physiology faculty to fill the questionnaire regarding difficulty in studying physiology and Calthorpe et al¹⁶ who asked the students to mark the difficult topics according to the modules. Item 11 was related to passing physiology exams by reading short books. Physiology tutors expect more than only retention of knowledge from their students. Our study findings are same as Michael¹⁵ study and

Miller et al¹⁷. study. Students believe that learning and memorizing is the same thing. It was also mentioned in Sonmez¹⁸ et al and slominski¹⁹ et al. The memory of students' knowledge of human physiology has been identified by numerous physiology educators to be wildly inconsistent²⁰. Item 18 was regarding teachers integrating physiology teaching with other skills. The educators need to employ creative teaching strategies that involve the students in active learning²¹. In active learning, the higher thinking processes of students are stimulated²¹. In rest of the table items, significant difference was not observed.

Physiology was rated as one of the most difficult courses by medical students, and its knowledge is generally not enough at a senior level of their medical education²⁰. To acquire the physiology concepts, a variety of cognitive processes, such as memorization, comprehension, analysis, classification, summarization, calculation, multidisciplinary connections, and clinical application is required, and it is inevitable that students with different cognitive levels and study styles learn at different paces²⁰. Causal reasoning, use of graphs and

sectionalize were remarkably important than any other aspect of teaching in making physiology hard to learn¹⁵. There is a significant difference between teaching and learning. The fact is, there is too much teaching and inadequate learning²². Teaching is not only passing the information to students about what we know, but it is instead, to show the students how we learn²². Teachers expect “understanding” or the ability to “think” about physiological mechanisms^{15, 19}. It is reported that students generally enter the physiology classroom lacking the expected prior knowledge and skills²³. It is also noticed that students, both pre and post instruction, have serious misconceptions about physiological phenomena²⁴. Students find it difficult to interpret graphs and to acquire a conceptual understanding of phenomena^{15, 19}.

There is an urgent requirement for teaching reforms to improve the teaching efficacy of human physiology in medical schools²⁰. The duty of teachers is to help students learn physiology¹⁵. The more they understand about learning, the better they acknowledge the causes of problems that students have in learning physiology and the better they can do their job¹⁵.

CONCLUSION

The medical students provided perspective regarding the difficulties in learning physiology and the reasons of these difficulties.

Author's Contribution:

Concept & Design of Study:	Sadaf Fatima
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