



## 'APPROACH OF MEDICAL STUDENTS TO PHYSIOLOGY: A FEEDBACK STUDY FROM TWO MEDICAL SCHOOLS IN A SUB-HIMALAYAN STATE OF INDIA'

### Physiology

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### ABSTRACT

Demands of best health care necessitates the revamping of the medical curriculum including Physiology which is the core of medical teaching in first profession MBBS. Students' feedback regarding the learning methodology, difficulties towards learning Physiology and their opinion regarding the improvement in teaching remains the cornerstone of this revamp. The information so gathered might help the medical fraternity in mapping the Physiology curriculum in a way to make it more informative and interesting for the medical students. A pre-tested Questionnaire prepared by the authors was used to seek the information from medical students regarding various parameters of learning and their difficulties while learning Physiology and also their opinion regarding the improvement in subject teaching of Physiology. It was administered to one thousand MBBS students, five hundred each from ASCOMS & Hospital, Sidhra, Jammu and Govt. Medical College (GMC), Jammu (J&K). Data thus collected was analysed and Chi-square test was used as test of significance. Approximately, 80% of students each from both the colleges were affirmative of importance of lectures and practicals also and about 60% each voted that the lecture notes were useful. Higher proportion of ASCOMS students reported tutorials as tool in subject learning ( $p < 0.05$ ). More than 80% students of either colleges emphasised the need of reference books in case of difficulty while very few students interacted with their class fellows, seniors and teachers. Lower proportion of GMC students used previous physiology exam papers for help ( $p < 0.05$ ). About 40%, 30% and 20% of the students from each medical college were in favour of the use of overhead projector (OHP), power point presentation (PPT) and chalk and blackboard respectively while teaching. Students of either colleges underlined the importance of clinical problems in understanding physiology and laid stress on its use more often along with integrated teaching ( $p > 0.05$ ). Students underscored the importance of lectures, tutorials and practicals in physiology learning while clinical problems were elicited to be highly useful. Students also opined in favour of integrated teaching. Authors emphasise the use of hybrid methods like OHP, PPT and chalk and blackboard while teaching with addition of interactive teaching sessions like Group discussions and problem based learning along with integrated teaching. Further, teacher student relationship needs to be more open, encouraging and friendlier.

### KEYWORDS

Physiology, Curriculum, learning methodology, medical students, medical colleges, medical schools, Acharya Shri College of Medical Sciences (ASCOMS), Govt. Medical College (GMC).

### Introduction

All of us are aware that the modern world is different from that of the ancient times. Science has progressed and evolved tremendously. This progress in science seems to be endless with another entity growing side by side in an explosive manner i.e., human population. In today's world the total number of diseases has not decreased but different new lifestyle diseases have also been added to the existing list of diseases. To give everyone a healthy lifestyle we need to have the best possible medical care and for this we need to have well trained and skilled medical personals. The latest available medical education has reached this pinnacle after a vast continuous research and restructuring but still we can't say it with full confidence that it is the best. Physiology forms the foundation of medical practice (Kamran, Rehman & Iqbal, 2011) and makes us wiser by providing us information about the human health and performance (Yograj, Bhat, Gupta, Kalsotra & Gupta, 2016). In the first year of MBBS, Physiology along with other two basic subjects, Anatomy and Biochemistry is taught to the medical students (Kumar, Ghildiyal, Rajpoot & Kumar, 2017). The preferred way of teaching Physiology in most of the medical colleges and universities all around the world is a hybrid one, which includes didactic lectures, demonstrations, tutorials and practical classes (Ghosh, 2007). Most of the students find it hard to study Physiology (Michael, 2007) and as teachers we should be able to help our students by understanding their ways of learning and the root cause of their difficulties. As per Michael (2007), we should change our teaching methodology by encouraging active learning among students that is at par with the needs of the students, our specific courses and teaching techniques. Due to flow of new technological advances into the sea of medical education, its reassessment should be done from time to time. So the need of the hour is that we update our medical curriculum, making it interesting and easy for the budding doctors to

comprehend it. We should assess the physiology teaching as an important step towards mapping the Physiology curriculum (Anto'nio, Rendas & Patri'cia, 2006; Plaza, Draugalis, Slack, Skrepnek & Sauer, 2007). For the assessment of the teaching, students' judgement is one of the best, as they are directly involved (Sikandhan, Dileep & Sassi, 2015). Using a structured questionnaire or another method of communication students' feedback can be one of the methods of evaluation of teaching (Dash, Patro & Behero, 2013). Our study is aimed to

- Collect the information in the form of students' feedback, regarding the methodology and difficulties of medical students towards learning Physiology,
- Their opinion regarding improvement in teaching of the subject &
- Then comparing this data from two medical schools in the Jammu province of Jammu and Kashmir (J&K) and see if their opinions differ or not?
- The information gathered by the authors will give a feedback regarding the medical student's favoured methods of learning Physiology, the drawbacks involved and their perspective of teaching improvement. Moreover, this information might be helpful for the authors and the medical educators in mapping the Physiology curriculum making it more informative and engaging for the medical students.

### Materials and Methods

After a proper permission from the institutional ethical committees of both the medical colleges, the study was conducted with the participation from one thousand medical students, five hundred each from the Acharya Shri Chandra Medical College (ASCOMS) & Hospital Sidhra, Jammu (J&K), India and the Govt. Medical College

(GMC), Jammu (J&K), India. First year students studying Physiology were not included as there might be a bias, so senior students who had already studied Physiology were included. A team comprising of senior faculty members of Physiology, from both the medical schools prepared a questionnaire of seventeen questions, which sought the information regarding the learning methodology of students, their difficulties and their opinion regarding the improvement in Physiology teaching. This questionnaire was first pilot tested on twenty- five pre-final MBBS students who were not the part of study sample. The questions were on two sheets of paper and could be answered easily within few minutes; all the questions had a simple choice of 'yes' or 'no'. Fourteen of the questions had a single answer, while three of them had multiple answers. To ensure confidentiality, name and gender of the participants were not recorded. The students were approached in practical/ tutorial classes and the purpose of study was clearly explained to them. They were asked to fill the questionnaire in their free time towards the end of the class in a stipulated time of ten minutes. The response rate was 100% as none of the students refused participation. The study was conducted during February 2016- February 2017. The data in the form of number and percentages was collected from the two medical schools, was tabulated and compared using chi-square analysis and paired students' 't' test applied to find the significance statistically. The p-value of <0.05 was considered to be statistically significant and that of >0.05 was not to be considered statistically significant.

**Result**

A total of one thousand respondents, which included five hundred students each from GMC and ASCOMS were part of the study. When asked about the necessity of the lectures in learning Physiology respondents of both the medical schools responded positively, GMC (81.8%) and ASCOMS (85.4%) (p>0.05). Respondents from both the medical schools (GMC:76.8% & ASCOMS:79.4%; p>0.05) replied that the attendance was also the reason for their attending the Physiology lectures. 69.2% of ASCOMS students as compared to 41.6% of GMC expressed that the tutorials were important in Physiology learning (p<0.05), so 55.8% of the ASCOMS students came prepared for tutorials while from GMC it was only 38% (p<0.05). The GMC students (58.6%) attended the tutorials just for the sake of the attendance in comparison with that of ASCOMS (48%) (p<0.05). Almost 80% of the students from the two medical schools labelled the practicals as an absolute must (p>0.05) (Table 1.)

Students of GMC (63.8%) and ASCOMS (65.6%) were unanimous in confirming the contribution of lecture notes to learn Physiology (p>0.05). More than 80% of the respondents from both the groups emphasised the importance of the main reference book with approximately 50% (p>0.05) were in favour of other books. 69.4% of ASCOMS students were of the opinion that the previous departmental Physiology examinations were indeed helpful in studying the subject in comparison to 27.4% of GMC students (p<0.05). Around 60% of the students in either of the groups were positive about the usefulness of the preceding university examination papers. (Table: 2.)

Regarding the help desk while encountering problems in understanding Physiology more than 80% of the respondents of the either of the medical schools preferred to consult the referred main book (p>0.05), followed by discussion among the class fellows (GMC:62.6%, ASCOMS:67%), consultation with seniors (GMC:39.2%, ASCOMS:42.6%) and lastly only one third of the either groups (GMC:35.8%, ASCOMS:37.2%) were keen to consult their teachers (p>0.05). Large number of students from either of the two medical schools (GMC: 77.4%; ASCOMS: 78.6%) hooked to the internet, while few of them (GMC: 23%; ASCOMS: 25.4%) also read scientific journals to solve their difficulties while studying Physiology (>0.05) (Table: 3.)

Students of both the medical schools were in unison (GMC: 78.6%, ASCOMS: 80.4%, p>0.05) in stating that the clinical problems of Physiology were beneficial in having a grasp of the subject and should more often be used (GMC: 78.2%, ASCOMS: 82.8%. p>0.05) while teaching Physiology. Teaching with overhead projector (OHP) was the preferred method in roughly 40% of students of either of the groups, followed by power point presentation by approximately 30% and only around 20% liked to be taught with the help of chalk and blackboard (p>0.05%). It was asserted by 75.6% of the GMC students and 78.8% of ASCOMS students that integrated Physiology teaching should be done (0.05). (Table: 4.)

**TABLE:1 STUDENTS PERSPECTIVE REGARDING THE IMPORTANCE OF LECTURES, TUTORIALS & PRACTICALS**

S. NO.	QUESTIONS	RESPONSE(Yes) Number(%age)		P-VALUE
		GMC	ASCOMS	
1.	Are lectures necessary to learn Physiology?	409 (81.8)	427 (85.4)	>0.05
2.	Attendance is the reason for attending the Physiology lectures.	384 (76.8)	397 (79.4)	>0.05
3.	Tutorials in Physiology help in learning the subject.	208 (41.6)	346 (69.2)	<0.05
4.	Attend tutorials for the sake of attendance.	293 (58.6)	240 (48)	<0.05
5.	Attend tutorials with thorough preparation	190 (38)	279 (55.8)	<0.05
6.	Physiology practicals are very important.	414 (82.8)	425 (85)	>0.05

**TABLE:2 ROUTINE STUDY MATERIAL OF THE STUDENTS FOR LEARNING PHYSIOLOGY**

S. NO.	QUESTIONS	RESPONSE(Yes) Number(%age)		P-VALUE
		GMC	ASCOMS	
1.	Absolute contribution of lecture notes towards learning Physiology	319 (63.8)	328 (65.6)	>0.05
2.	Importance of reference books:	423 (84.6)	441 (88.2)	>0.05
a).	Main advised reference book.	262 (52.4)	288 (57.6)	>0.05
b).	Others.			
3.	Help of previous Physiology examinations in the department.	137 (27.4)	347 (69.4)	<0.05
4.	Usefulness of preceding university examination papers.	315 (63.1)	334 (66.8)	>0.05

**TABLE:3 WHEN ENCOUNTERING PROBLEMS IN UNDERSTANDING PHYSIOLOGY: WHAT DO THE STUDENTS DO?**

S. NO.	QUESTIONS	RESPONSE(Yes) Number(%age)		P-VALUE
		GMC	ASCOMS	
1.	Help desk when encountering problems in understanding Physiology.	179 (35.8)	186 (37.2)	>0.05
a).	Teachers?	196 (39.2)	213 (42.6)	>0.05
b).	Senior students?	313 (62.6)	335 (67)	>0.05
c).	Class fellows?			
d).	Reference books?	419 (83.8)	436 (87.2)	>0.05
2.	Need to hook up to the internet for added information on Physiology.	387 (77.4)	393 (78.6)	>0.05
3.	Consulting scientific journals for solving difficulties in Physiology.	115 (23)	127 (25.4)	>0.05

**TABLE:4 STUDENTS' OPINION REGARDING IMPROVEMENT IN THE PHYSIOLOGY TEACHING:**

S. NO.	QUESTIONS	RESPONSE(Yes) Number(%age)		P-VALUE
		GMC	ASCOMS	
1.	Clinical problems are beneficial in understanding Physiology	393 (78.6)	402 (80.4)	>0.05
2.	Clinical problems should be used more often for teaching Physiology.	391 (78.2)	414 (82.8)	>0.05
3.	Preference for method of teaching:	132 (26.4)	116 (23.2)	>0.05
a).	Chalk and blackboard?	203 (40.6)	228 (45.6)	>0.05
b).	Overhead projector?			
c).	Power point presentation?	165 (33)	179 (35.8)	>0.05
4.	There should be integrated teaching in Physiology.	378 (75.6)	394 (78.8)	>0.05

## Discussion

In recent years, with the increasing awareness among the society towards leading a healthy life, demands for the best possible health care has increased. To provide this we need to have well trained medical personals. This is the rationale behind the intense revamping of the medical education for at least more than thirty years, when earlier it was targeted just to fulfil the shortage of the medical individuals. The current medical education is more concerned with the methods in which basic sciences and clinical subjects are taught (Dhaliwal, 2007).

### *'The Physiology of today is the Medicine of tomorrow'* Ernest H Starling, Physiologist (1926).

Human Physiology is basically the study of life and functioning of internal milieu and its interaction with its surrounding for survival. It works as a foundation for medicine, science and other health related subjects, making us understand the adaptive response of human body to the day to day stress and diseases. We need to redesign the methods of basic science training as the medical curriculum tends to get outdated within a few years because of bombarding of new information with new technological advances (Harden, 2003). Curriculum is basically a plan for learning and the educational system is based on the skeletal framework of curriculum along with modification in teaching learning methodology used by the teachers and time to time opinions from the students about the existing educational system (Das, Sethi, Rauniar & Sangarula, 2006). So as to assess and improve the teaching methodology, students' feedback is the best (Harden, 2003). In a teaching system it is the students who are at the receiving end, so they are in the best possible position to comment on the efficacy of a teaching system (Yograj et al., 2016). In our study, help of MBBS students' were sought in the form of feedback about their adopted learning techniques, difficulties faced by them while studying the subject i.e., Physiology and their opinion regarding improvement in the teaching methods from the two medical schools in the Jammu region of Jammu & Kashmir, a state of India. The study was targeted to identify the merits and de-merits of the old curriculum and modern day innovations required in Physiology education. In our study, we found that students of both the medical schools were enthusiastic to learn Physiology which is one of the basic subjects forming the pillar of future medical education. About more than 80% of the respondents of both the medical schools were in favour of lectures which were consistent with the findings of multiple studies (Abdalla, 2008; Elkhair & Alharbi, 2014; Sikandhan et al., 2015). According to Cunniff et al., (2009), when compared to other teaching methods lecture is the most cost effective. Basically lectures follow a proper scientific approach and impart the required theoretical knowledge to the students who are generally unable to organise vast information in a concise manner (Miner, Das & Gale, 1984; Van & Spencer, 1988; Whetten & Clark, 1996; Michael, Cater III & Varela, 2009; Yograj et al., 2016). As per the respondents of both the medical schools, attendance was also one of the reasons behind their attending the lectures. Duddley and Harrison (2007), stated that the lectures should be delivered with essential content and should be presented properly, so that the students are able to comprehend the topic and get motivated without being overloaded. Depending on the system or topic to be taught appropriate techniques like flow charts, power point presentations, animation should be incorporated so that the students get attracted towards attending lectures (Baruah & Patel, 2014). 69.2% of ASCOMS students as compared to 41.6% of GMC students added that the tutorials formed an important tool for learning Physiology, so most of them were keen to attend them irrespective of the attendance issue. These findings were in agreement with the studies of Abdalla (2008); Elkhair and Alharbi (2014) and Skandhan et al., (2015). Approximately 55.8% of them came prepared with the tutorial topic in advance which was in contrast to the results reported by Abdalla (2008). If one compares tutorial with the lectures, tutorials are more interactive as students are not just the passive recipients but can easily clear their doubts and express their knowledge. Students are encouraged to discuss the topics amongst themselves under the guidance of teachers. Problem can arise with tutorials when equal opportunities can't be provided to each and every student if there is high student-teacher ratio. Tutors may be biased as some extrovert students might try to intimidate the shy ones (Yograj et al., 2016). Almost 80% of the respondents from each of the colleges labelled the practicals as an absolute must which is at par with the findings of Elkhair and Alharbi (2014) but less number of students were in favour of the practicals in the study of Abdalla (2008). Practical give a hand on experience to the

students; they feel motivated and can comprehend the subject in a better way as they can see the results themselves. More than 60% of the students from the each study group were united in confirming the importance of lecture notes in studying Physiology. Similar views were put forth by the students in the study of Elkhair and Alharbi (2014) but the views were not shared by the students of Abdalla (2008) study. Some students instead of attending lectures prefer to read the lecture notes which they borrow from their class mates to study the subject (Edlich, 1993). Still 80% or more students from either of the groups in our study emphasised the importance of the main reference book, while in some studies (Abdalla, 2008; Elkhair et al., 2014) less number of students were using the reference books. ASCOMS students also preferred to use the previous departmental examinations in the Physiology department to study the subject in comparison of students from GMC. Time to time evaluation of the students in the subject inspires them to assess their performance and boost them to improve their knowledge. Most of the students from the two medical schools made use of preceding university examinations of their seniors, this was in sync the findings of Khartoum study (Abdalla, 2008). It was disheartening to find that in our study when faced with difficulty in understanding the subject only one third of the respondents from the each group consulted their teachers, large number of them looked into their reference books, and few of them discussed with their class fellows or seniors. Now this finding that the students have less faith in their teachers and avoid one to one contact with them needs to be resolved. For last more than a decade MCI (Medical Council of India) has reduced the first year duration to one year without much alteration in the syllabus of the basic sciences subjects. So most probable reason might be non-availability of the teachers because of their busy teaching schedule or the hesitation on the part of the students. The teachers should try to be frank, friendly and motivate the students in best possible way so that they willingly approach the teachers during their difficulty in the academics (Yograj et al., 2016). Welcome findings in our study was the students surfing the internet and reading scientific journals to sort out their difficulties in studying Physiology as we don't expect this from undergraduate students and consider it to be prerogative of the post graduate students. Least number of students in the Khartoum study (Abdalla, 2008) and Umm-Al-Qura study (Elkhair et al., 2014) were using internet to solve their difficulties while studying Physiology. Students of both the medical schools were in unison that the clinical problems in Physiology helped them in better understanding of the subject and opined that they should be used more often in Physiology teaching. These findings of our study were consistent with the finding of Gosh et al., (2000) and that of Mohammad, Obeidat, Bashir & Ai-hoqail (2011). It is seen that teaching Physiology by incorporating clinical problems improves learning and critical thinking skills among medical students (Abraham, Upadhya, Torke & Ramnarayana, 2004; Abraham, Kamath, Upadhya & Ramnarayana, 2006;). Framing a clinical problem related to the topic is a herculean task, as it requires a lot of in depth knowledge and understanding of the Subject (Bizzocchi & Schell, 2009; Cunniff et al., 2009) and it should cover all the basic principles and the goals required (Sikandhan et al., 2015). When asked about their opinion regarding the best teaching methods in imparting lectures in Physiology, about 40% of the respondents from each of the medical schools in our study gave vote to overhead projector (OHP) followed by power point presentation (PPT) (approximately 30%) and only around 20% liked to be taught with the chalk and blackboard. Findings of our study were not consistent with that of Nagothu, Reddy and Paluru (2016), where more students opted for chalk and blackboard followed by PPT and OHP. For a teacher using chalk and blackboard method, should have a great drawing and writing skills and though it can be a better way to teach concepts but sometimes teacher might lose an eye contact with his/her students (Kumar, 2000). Certain drawbacks with PPT have been reported like students getting bored and distracted (Kaharaman, Cevika & Kodana, 2011), in addition to becoming the passive recipients (Casanova & Casanova, 1991) and sometimes even sleep inducing (Dhaliwal, 2007). We suggest that we should combine all the three methods i.e., OHP, PPT and chalk and blackboard, while delivering lectures in Physiology along with the active participation of the students. Great majority of the respondents (>75%) of each study group were in favour of integrated teaching in Physiology.

Integrated teaching basically coordinates and inter-links the subjects taught among separate academic courses and departments (Harden, Sowden & Dunn, 1984). Integrated teaching in Physiology while co-relating with different clinical departments makes the subject

interesting for the students and they understand it in depth while craving for more.

### Conclusion

The study has made it clear that the undergraduate MBBS students are enthusiastic in learning Physiology, one of the basic subjects. They fully understand the importance of lectures, tutorials, practicals and lecture notes and are using them fully to study the subject. During difficult times in their study they are freely consulting their reference books, class fellows, seniors, online sources and even scientific journals but least the teachers. They considered the clinical problems in Physiology extremely important and opined to include them in Physiology teaching along with integrated teaching. They preferred OHP method of teaching to PPT and chalk and blackboard methods. We need to understand that in the modern day scenario with vast medical knowledge to be learned by the medical students, we can't expect them to completely learn Physiology like older times but our Physiology curriculum should be such that they learn its fundamental aspects to other medical subject and diseases. From this study we can well understand that there is no single ideal curriculum for Physiology teaching. Authors suggest and conclude:

- (i) Lectures, along with tutorials and practicals are and should form an important core of Physiology curriculum.
- (ii) To deliver the lectures free usage of combination of OHP, PPT and chalk and blackboard methods should be there.
- (iii) More interactive teaching sessions in addition to tutorials like group discussions, problem based learning, etc. should be used where students are an active participant.
- (iv) Teachers should encourage their students, be available to them, and become friendly so that the students consult their teachers more often when facing difficulties.
- (v) Clinical problems related to Physiology should be made compulsory along with integrated teaching.

### Limitations

Our study has added to the ongoing discussion of revamping the Physiology curriculum. We should have considered the opinion of teaching faculty also, as this can help in defining different teaching methods, core curriculum and evaluation techniques. More studies need to be done from more number of medical schools, with equal participation of students and teaching faculty. Questions seeking opinion of the students about different evaluation methods and experiences of teaching faculty on teaching and evaluation techniques should be asked.

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