

Perception and Experience of Medical Students regarding Hybrid Problem-based Learning Technique at a Medical College in West Bengal, India: A Cross-sectional Study

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ABSTRACT

Introduction: Hybrid Problem-Based Learning (h-PBL) is a type of teaching learning technique that incorporates both in-person learning and virtual learning via hybrid classroom tools. It reportedly increases student engagement, positively impact their learning process and improve communication skills. During Coronavirus Disease-2019 (COVID-19) times, its applicability was further enhanced as it allowed the flexibility of teaching as well as learning from home to both teachers and students.

Aim: To assess the perception and experience of 2nd phase MBBS students after undergoing training by the h-PBL method.

Materials and Methods: A cross-sectional study was conducted on 2nd phase MBBS students in the Department of Microbiology at College of Medicine and Sagore Dutta Hospital, Kolkata, India, from 15th March to 14th April 2022. A total of 111 students of 2nd phase MBBS of the college gave an informed consent to be part of the study. All inductees underwent a structured training by h-PBL technique following which their perception and experience about the exercise was sought via questionnaire. Data were presented in frequency and percentage. Association

between mean scores of male and female participants was calculated by Chi-square test.

Results: Out of the 111 participants, 58 (52.2%) were male and 53 (47.8%) were female with mean age of 19.5±0.5 years (range 18-22 years). The h-PBL technique was perceived to be motivating for self-directed learning by 95 (85.6%) of the respondents. A total of 107 (96.4%) students agreed that h-PBL is more effective than traditional teaching for acquiring both theoretical and practical knowledge, learning and understanding topics correctly and also identifying and rectifying their deficiencies in knowledge and skills. More than 90% participants (102 of 111) felt that h-PBL has more potential than traditional teaching to establish fruitful student teacher interaction and provide better feedback opportunities. Overall student satisfaction in present study showed 107 (96.4%) agreement.

Conclusion: The students considered h-PBL model to be better than traditional teaching to help them acquire theoretical knowledge and practical skills. They also felt that it improved their communication skills, teamwork ethics and motivated them to undertake self-directed learning.

Keywords: Coronavirus disease-2019, Online teaching-learning technique, Self-directed learning

INTRODUCTION

Hybrid-Problem Based Learning (h-PBL) is a type of teaching-learning technique that incorporates both in-person learning and virtual learning using hybrid classroom tools [1]. In the field of medical education, the h-PBL technique has been reported to increase student engagement, improve attention span, ensure better knowledge retention, promote better communication skills between students and teachers and have an overall positive impact on the learning process amongst the medical students [1-3].

The primary operational idea behind hybrid learning technique is generally thought to have originated from the pioneering works of Benjamin Horton, whose quote viz. 'I hear and I forget, I see and I remember, I do and I understand' aptly conveys the essence of h-PBL [4]. The Harvard Medical School is attributed to be one of the pioneering institutes to have adopted the hybrid model of teaching to improve the quality of medical education. They designed and implemented a 'New Pathway curriculum' in the later part of the last century in which substantial amount of h-PBL sessions were incorporated and was aimed to stimulate individual initiative as well as balance the latest developments in medical science with the age-old values of teaching [1,5].

However, in spite of its obvious advantages, the hybrid way of learning has its own implementational challenges as it is inherently resource intensive by design and requires the institutions to have

adequate teaching infrastructure and trained manpower along with a well-designed curriculum [1]. Thus, this technique remained largely neglected as a teaching-learning tool for imparting medical education in developing nations like India till recently [6].

It had long been the 'felt-need' of medical educators in India to have a more learner-centric medical education curriculum. It led to the introduction of the new Competency Based Medical Education (CBME) curriculum in 2019 which envisioned to churn out Indian medical graduates who would exhibit adequate and quantifiable competency in the spheres of knowledge, skill and sensitivity [7].

To achieve that goal, many notable changes in the deliverance of medical education was suggested which included introduction of a foundation course, more emphasis small group discussion sessions problem-based learning, self-directed learning, early clinical exposure, vertical and horizontal integration sessions etc [7]. But all such endeavours took a backseat due to the sudden emergence of the COVID-19 pandemic. As the pandemic situation continued to linger, avenues were sought by medical educators to continue delivering medical education without violating the COVID-19 norms. That is when the adoption of the hybrid learning methods was mooted, tried, promoted and ultimately established as it offered a flexible and safe option to both teachers and students to remain involved in regular classes even when they stayed at home to abide the pandemic norms or on account of their sickness [6,8,9].

In recent times the COVID-19 pandemic is thankfully on the wane and consequently there has been relaxation on almost all stringent pandemic norms. This has allowed medical institutions to return to pre-COVID ways of teaching. However, the definite advantages of the hybrid model of teaching is now much more clearly evident to both teachers and students and various medical institutions worldwide as well as in India have been conducting studies of varied designs to document the perception and experience of the medical students who received their medical education by the hybrid learning model. Most of these studies relied on students' recall of their hybrid learning experience during the entirety of the COVID period [9-13]. The present study is designed on similar terms but unlike the aforementioned studies, the concerned study required the participants to give a more first hand and current feedback of their perception and experience of h-PBL model of teaching after undergoing a structured h-PBL session.

Hence, present study was conducted to assess the perception and experience of 2nd phase MBBS students after undergoing training by the h-PBL method.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Microbiology Department of College of Medicine Sagore Dutta Hospital, Kolkata, a tertiary care teaching hospital in West Bengal, India from 15th of March to 14th of April 2022. The study was initiated after receiving approval from Institutional Ethics Committee (IEC Memo No: CMSDH/IEC/279/03-2022). The study participants were informed about the details of the study objectives at the beginning of the study and written informed consent was taken.

Inclusion criteria: All those 2nd phase MBBS students who were willing to participate in the study and signed an informed consent were included.

Exclusion criteria: Those students who were unwilling to participate from the outset and those students who agreed to participate but did not attend both or either of the online and offline classes which were part of the study, were excluded.

Sample size calculation: The survey was planned to be performed on all 2nd phase MBBS students, i.e. 128. But after applying the exclusion criteria, the remaining 111 students were enrolled as final sample size.

Study Procedure

A faculty core group was formed comprising of four faculties from the Department of Microbiology. The faculties took a total of four problem-based hybrid classes in the first month study period. The four topics that were chosen for the h-PBL sessions were infectious

causes of fever, anaemia, diarrhoea and jaundice. Each h-PBL session consisted of a 30 minute online lecture followed by two hours offline small group interactive discussion and activity session on same topic. The 111 students were segregated into 4 groups consisting of 28 members each in the first 3 groups and 27 in the last one, for the purpose of the small-group discussions. The activities that were done included role-play sessions, clinical case scenario discussion, simulated clinical report analysis and quizzes. After completion of all four sessions, the perception and experience of the students to this approach of teaching was sought by way of a questionnaire, which was circulated among them via email and Whatsapp and their responses were obtained.

The questionnaire was created using Google forms by the members of the faculty core group involved in the study. For devising the questionnaire the members mostly depended upon their previous experience from projects conducted in the department. It was structured to be self-administrable and contained close-ended questions. The questionnaire was 'face-validated' by a panel of relevant experts in the field. The final questionnaire consisted of 10 questions with close-ended single-response type multiple choice answers in a five-point Likert scale with 'strong disagreement' being ascribed '1' point and 'strong agreement' '5' points. So, the maximum possible total score for each question was 555 (111×5) and minimum 111 (111×1). If the sum of all the responses to a particular question was ≤333, the interpretation was that the participants' experience/perception in that aspect was 'unsatisfactory/negative' during the h-PBL session and if it was >333 then the same was considered 'satisfactory/positive'. Out of the 10 questions in the questionnaire, the first and the last question was about the 'experience' and the rest were about the 'perception' of the participants.

STATISTICAL ANALYSIS

Data from the responses to the questionnaire was entered in Microsoft excel. Scores for responses to individual questions was summated by the excel software. Association between mean scores of male and female participants was calculated by Chi-square test using Open Epi platform (version 3.01). A p-value <0.05 was considered to be significant.

RESULTS

The study participants were mostly between 18-22 years of age with mean age of 19.5±0.5 years. Out of the 111 participants, 58 (52.2%) were males and 53 (47.8%) females. The responses that the students gave to the 10 questions of the questionnaire are presented in [Table/Fig-1].

The summation of the scores for the responses to the questions pertaining to students' experience, namely the first and the last

Q. No.	Questions	Responses						Mean±SD
		Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	Total score	
1	This teaching approach is a novel and enriching experience for students.	0	1	1	34	75	516	4.65±0.55
2	This model has more impact on learner in terms of theoretical knowledge.	1	1	2	46	61	498	4.68±0.711
3	This model has more impact on learner in terms of practical application of the knowledge/skill.	1	1	2	45	62	499	4.495±0.672
4	Hybrid model motivated me to undertake self-directed learning.	2	0	14	29	66	490	4.4144±0.847
5	It provided me with the information whether we are learning the topics in the correct way.	0	0	4	45	62	502	4.522±0.5696
6	During the class, I was given suggestions on how to improve my knowledge. It has helped me to reflect on my weakness and gap analysis.	0	1	3	40	67	506	4.56±0.598
7	It has helped me to build a good rapport with the teacher.	1	1	7	43	59	491	4.423±0.733
8	Adequate time was given by the faculty for clearing my doubts.	0	0	6	34	71	509	4.58±0.596
9	Valuable one-to one feedback can be incorporated in this model.	0	0	7	46	58	495	4.468±0.615
10	I was satisfied with the overall experience.	0	1	3	36	71	510	4.594±0.593

[Table/Fig-1]: Responses of students to the questionnaire (N=111).

question of the questionnaire, were 516 and 510 respectively. Hence, experience wise, the h-PBL sessions can be considered to be quite 'satisfactory' to the students. Individual summative scores of all the other questions were much greater than 333, which was the cut-off score set to deem responses to a question positive or negative. As all these questions were formulated to obtain the students' perception to various facets of the h-PBL like motivation for self-directed learning, promoting healthy student-teacher relationship, fostering better knowledge acquisition and retention, identifying weakness and gaps in knowledge etc., it can be safely inferred that perception wise the h-PBL exercise was 'positively' accepted by the participating students [Table/Fig-1].

The responses from the 58 males and 53 females students were segregated into two groups and the mean scores for each question calculated. The mean-scores for each question when segregated for gender remain comparable as there are no significant differences (p -value >0.05 for all questions) between the males and females in terms of perception and experience for h-PBL technique [Table/Fig-2].

Question No.	Males n=58 (Mean \pm SD)	Females n=53 (Mean \pm SD)	Chi-square (χ^2)	p-value
1	4.62 \pm 0.587	4.679 \pm 0.51	0.0227	0.4401
2	4.448 \pm 0.776	4.528 \pm 0.54	0.02423	0.4382
3	4.483 \pm 0.706	4.509 \pm 0.639	0.02328	0.4394
4	4.414 \pm 0.838	4.415 \pm 0.864	0.01671	0.4486
5	4.534 \pm 0.569	4.509 \pm 0.576	0.01426	0.4525
6	4.586 \pm 0.563	4.528 \pm 0.638	0.01249	0.4555
7	4.414 \pm 0.773	4.434 \pm 0.694	0.01837	0.4461
8	4.6 \pm 0.59	4.56 \pm 0.604	0.01403	0.4529
9	4.43 \pm 0.652	4.49 \pm 0.575	0.02217	0.4408
10	4.568 \pm 0.627	4.62 \pm 0.562	0.02167	0.4415

[Table/Fig-2]: Gender wise table of mean-scores, Chi-square score and p-value.

DISCUSSION

The present study was carried out among the 2nd phase MBBS students, who were first exposed to the hybrid model of teaching and then their perception and experience about this teaching-learning technique was obtained by means of a predesigned questionnaire.

The hybrid-Problem Based Learning (h-PBL) technique was perceived to be quite novel and enriching experience by almost all of the respondents in this study (109 of 111). It was also perceived to be a motivation for self-directed learning by majority (95 of 111) of the respondents of the study. Kharay SS et al., in their work evaluating h-PBL among 1st year MBBS students also reported that h-PBL was perceived to be a novel and intellectually enriching experience by the students and increased their motivation towards self-directed learning [14].

In the study, 107 out of 111 students 'agreed' to the idea that h-PBL is more effective than traditional teaching for acquiring both theoretical and practical knowledge. Lian J and He F, in their work had similar findings wherein their respondents, which consisted of 2nd year medical students, reported hybrid-PBL to be an effective learning method and considered it better than traditional teaching methods at improving their basic knowledge and problem-solving skills [15].

Chilkoti G et al., in their study to assess and compare the satisfaction of 1st year medical students trained in Basic Life Support (BLS) both by lecture-based and hybrid-PBL methods found that most students preferred h-PBL method over traditional lecture-based method for learning and understanding topics correctly and also identifying and rectifying their deficiencies in knowledge and skills [16]. In this study also almost unanimous agreement (107 of 111) in responses were obtained from the students when queried on similar notions.

Majority of the participants in this study 'agreed' to queries that asked them about the potential of h-PBL being better than traditional teaching to establish fruitful student-teacher interaction and to provide better feedback opportunities. This has also been corroborated in the works of Armstrong EG et al., and Chang BJ, [1, 17].

Overall student satisfaction in this study showed 107 (96.4%) 'agreement'. Jiménez-Saiz R and Rosace D, in their systematic review also reported that the use of h-PBL was superior compared to traditional teaching and pure-PBL as evidenced by the high level of student's satisfaction of the different studies reviewed by them [18].

In this study, no significant difference of response between male and female participants was noted both for 'experience' and 'perception' to h-PBL method of teaching. The authors could not find any relevant literature where similar comparison was done using h-PBL technique but Kassab S et al., had reported gender related differences in performance of participants (females performing better than males) in student-led PBL methods [19].

Limitation(s)

The main limitation of the present study was that, it included a slice of MBBS students from single professional year and not from all three professional years of MBBS study.

CONCLUSION(S)

Hybrid-PBL as a teaching-learning tool was a novel experience to most of the study participants and their overall satisfaction to this method of learning was almost unanimous at the end. In terms of perception, responses of the study participants tend to indicate that they felt, they can acquire theoretical knowledge and practical skills better with h-PBL technique than by traditional teaching methods. They also perceived that the h-PBL method fosters healthy student-teacher relationship, improves communication skills, teaches proper teamwork ethics and is a motivating stimulus to undertake self-directed learning. Another important aspect that was noted from this study is that the student feedback generated from it can be utilised to remodulate the hybrid method and further implement it in an improved way in accordance to the learner's acceptance. But, to extrapolate the findings of this study on a large scale, a bigger multicentre study with a larger sample size that includes participants from all three professional years of MBBS course is deemed necessary by the authors.

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