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An Online Study of MBBS Student Performance in Internal Assessment of a Pre-clinical Department during the COVID-19 Pandemic

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Abstract

Background: The COVID-19 pandemic has had a significant impact on medical education. As the crisis persists, it is critical to develop valid and reliable assessment methodologies. **Aims:** The aims of this study were to determine the impact of competency-based medical education ("COMPETENCY-BASED MEDICAL EDUCATION") implemented online in the biochemistry department during the pandemic on the results of online internal assessments. **Materials and Methods:** After receiving institutional clearance in 6 months, this pilot study was done on 150 1st-year MBBS students at IQ City Medical College and Hospital, Durgapur. In 6 months, two internal assessments have to be completed online. Multiple choice questions, short answer type questions, orals, and spots were divided into four compartments during our internal evaluation sessions, which were held 3 times a month. A survey was conducted to gather data pertaining to student stress levels during offline and online examinations. Statistical analysis: The data were analyzed using the paired *t*-test. Reliability of data was checked using Cronbach's alpha. **Results:** Participants ranked Expected Offline Examination Stress Risk higher (M = 4.7200, Standard deviation [SD] = 1.58906) as opposed to the Expected Online Examination Stress Risk (3.6800, SD = 1.53841), a statistically significant mean increases of 1.04000, and 95% confidence interval (CI) [0.81192, 1.26808], *t* (149) = 9.010, *P* < 0.001. In case of perceived risks, participants ranked Perceived Offline Examination Stress Risk higher (M = 4.7600, SD = 1.64533) as opposed to the Perceived Online Examination Stress Risk (M =3.6867, SD = 1.63081), a statistically significant mean increases of 1.07333, 95% CI [0.83098, 1.31568], *t* (149) = 8.751, *P* < 0.001. **Conclusions:** According to the findings of this study, students expect and perceive online examination stress risk to be lower than that of offline examinations. The research also revealed that students were able to score higher in online tests than in offline exams, implying that the department of biochemistry may conduct internal assessments as well as implement "COMPETENCY-BASED MEDICAL EDUCATION" online.

Keywords: Assessment, Competency-based medical education, COVID-19 pandemic

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Introduction

The COVID-19 pandemic has had a significant impact on medical education. Medical educators have previously faced a significant problem in teaching clinical skills online. As the crisis persists, it is critical to develop valid and reliable assessment methodologies.[1-3] This is important to maintain medical education standards while also accommodating COVID's current environmental and societal constraints. This crisis, on the other hand, has provided an opportunity to shift from a traditional program to a competency-based curriculum.[1] In terms of teaching learning activities and assessments, online education offers a lot of potential. The assessment can be done in a variety of ways, including online conversation and learning assessment progression through a facilitator; receiving feedback; reflective writing; use of e portfolios; use of crossword puzzles and multiple-choice questions (MCQs); real-time exam; and so on.[4-10] The majority of these techniques can be used to measure the cognitive domain. Virtual cases can be used to examine the skill domain. The promptness of response, consistency, and attempts made to clarify the queries addressed which can all be used to evaluate the affective domain.[4-10]

Both formative and summative examinations can benefit from online methods. The previous investigations have shown that they are extremely effective. With the current pandemic, now is the moment to explore moving the focus of assessment to the acquisition of competencies, as the new competency-based medical education curriculum has already arisen. It is necessary to establish multimodal methods for formative and summative assessments that focus on mastery of clinical reasoning, problem-solving, and decision-making abilities to shift to a competency-based curriculum. The objective at hand is to create and monitor a balanced face-to-face and online assessment program in a timely manner. However, the assistance of regulatory and licensing agencies must also be addressed when establishing this resource availability.[1,4-10]

Medical schools have wisely devised other teaching and learning methods during the COVID lockdown. In a few research,

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there are additional adjustments in the assessment. To assess not just the effectiveness of these new teaching/learning methodologies, but also to maintain medical education standards, a complete strategy is required.[1,11]

Medical educators must ensure that the upheaval observed with COVID does not spread to the educational side. As a result, a tiered plan must be devised to attain the required results. As COVID-19 continues, certain immediate measures are essential. Assessment is often the endpoint in curriculum design; thus, certain immediate steps are required. Not only existing but also potential students should be included in the strategy. This is also an opportunity to keep the "goal in sight" and introduce strategies from "COMPETENCY-BASED MEDICAL EDUCATION" one step at a time.[1,11]

Online assessment in medical education has several advantages over traditional modes of assessment: Students can receive immediate feedback on their progress; tutors can more easily track learners' progress and achievement of milestones; and students can receive immediate feedback on their progress. For medical education institutes, computerized marking streamlines a previously time-consuming task.[12-17]

Another issue with online testing is the security procedures in place to protect assessments. When an online evaluation is used for summative reasons, it is critical. Because large-screen assessments may present clear incentives to cheating applicants, both physical and internet security measures will need to be coupled to avoid cheating.[18-20]

Due to the pandemic's abrupt lockdown, our pupils were forced to flee the school. As a result, we had to deploy "COMPETENCY-BASED MEDICAL EDUCATION" online during the COVID-19 pandemic. We used various formative tests to assess competencies, and we gave and received feedback from the students on a regular basis. The purpose of this study was to see how the "COMPETENCY-BASED MEDICAL EDUCATION," we tried to apply in the biochemistry department during the pandemic affected the outcomes of internal assessments completed online.

Materials and Methods

After receiving institutional clearance, this pilot study was undertaken at IQ City Medical College and Hospital in Durgapur for 6 months (March–September 2020).

Study Design and Participants

During the COVID-19 pandemic, this prospective study was used to evaluate the possibility of multiple online assessment parameters for predicting student performance in undergraduate medical education of biochemistry. A cohort of 150 1st-year medical students enrolled in the MBBS program at IQ City Medical College and Hospital in Durgapur participated in the study. The module consisted of a 180-day teaching and learning period with daily teaching and learning activities and a 3-monthly internal assessment examination.

Inclusion Criteria

The study comprised 1st-year medical students at the undergraduate level. On March 20, 2020, we began our online teaching program after all of our students had left their hostels and returned home. A departmental meeting was held, and it was determined that the Department of Biochemistry at IQ City Medical College and Hospital, Durgapur, would use Flipped Classroom as a teaching method. In the current crises, self-directed learning is being used as a teaching strategy. Many of the students live in remote villages, and many places have poor network connectivity. As a result, it is extremely difficult for them to participate in online classes using apps such as Zoom or Google Meet. Many of them come from a low-income family and are unable to afford more expensive data bundles. As a result, we decided to use this teaching style, namely, flipped classroom, and supported self-directed learning.

All undergraduate students, faculty, and residents of the department of biochemistry were invited to join a WhatsApp group. The group has a total of 230 people in it. Students were then divided into ten batches (each with twenty students; each batch formed its own WhatsApp group), with a team leader for each batch (One of the class representatives). All students were invited to join a Google Classroom called IQCMC and H MBBS 2019–20 bio-chemistry, which was created with the class code provided to them. For improved connection with the students, a Google group (email) was developed with ten class representatives from the student group and faculties. This also made it easier to keep track of the students.

For all of the topics, they were taught, the students were given PowerPoint presentations with voice recordings and YouTube video recordings. Because they were unable to download large PowerPoint presentations with their data bundles, multiple little PowerPoint presentations were sent. Each competency was broken down into objectives, which were addressed in voice conversations in the WhatsApp group, along with related graphics. Students had sessions to resolve their doubts, which were held on Google Meet. Due to network connectivity issues, these sessions only lasted 30 min and included 20 students and one faculty member. To promote active learning, small group conversations were encouraged. As part of formative assessment, students were provided feedback on 16 MCQs. Students were also polled about the teaching learning program and required changes were made as a result.

Before the COVID-19 epidemic and lockdown, our department had previously completed an internal assessment. According to the new curriculum, we must conduct three internal assessments for the first professional MBBS. As a result, two internal examinations were required to be completed online.

Only 20% of the entire evaluation can be done with MCQs, according to revised curriculum rules effective in 2019.[1] As a result, we separated our assessment sessions, which were held 3 times a month, into four categories: MCQs, short answer type questions, orals, and spots (for practical examination). According to the new curriculum, pupils must achieve a minimum score of 50% on internal assessments. Departmental meetings were held before the assessment sessions, and senior faculty members posed questions. This meeting also settled on all of the answers and markings.

Because students are at home and there is no way to keep them from searching through books, assessment is the most difficult aspect of teaching online.[19-21] Valid and dependable assessment procedures are required [Table 1].[1]

To make, the assessments valid and reliable the following measures were taken:

1. The examination consisted of 20 MCQs with four response alternatives each. The questions addressed all of the

assessment platform's important areas. There was a time limit on the MCQ examination, and candidates could only attempt it once. The questions were all based on an issue. There were no blemishes on the paper. The kids got 30 min to answer 20 questions. Marks allotted: 20. The evaluation was completed using a Google form.

2. The time was written down on the sheets, and the link was only active for 30 min.
3. All of the short answer questions were problem-based, and students only had a limited amount of time to respond. Within one hour, 15 of these questions had to be answered and sent to their professors. The total number of marks granted is 30. The evaluation was carried out utilizing a Google form.[23-25]
4. They have to respond in voice messages or video presentations within a certain amount of time for oral sessions. The total number of marks granted is 25. In these sessions, one teacher examined 20 pupils utilizing the Google Meet platform.
5. The spots were arranged in groups of 20 and had numerous structured questions that had to be answered in a certain amount of time. These were also problem-based, and each group of five pupils had to complete the same questions. There were four sets of questions for each group. The total number of marks granted is 25. One teacher tested 20 students in these sessions, which were conducted using the Google Meet platform. This was for the purpose of evaluating the practical portion of the syllabus.

Many of our students expressed concern about their stress levels, which have been found to be much higher among health-care workers during the current pandemic in various studies.[22] Hence, over the course of 3 months, we conducted two surveys to assess the stress levels of students using Sheldon Cohen's perceived stress score. We told them that the findings of their mental health tests would be kept totally confidential, and that they would receive assistance as needed. To evaluate our instructional program, we also completed two feedback surveys.

Table 1: Validity and reliability

Validity	*Reliability*
Authenticity of assessment activity	Clarity of learning goals
Multidimensional perspectives	Multiple assessors
Effective formative feedback	Documenting evidence
Students' support	Multiple techniques

Table 2: Reliability statistics

Cronbach's Alpha	*Cronbach's alpha based on standardized items*	*N of items*
0.885	0.886	4

Table 3: Paired samples statistics

Details		*Mean*	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	Expected offline examination stress risk	4.7200	150	1.58906	0.12975
	Expected online examination stress risk	3.6800	150	1.53841	0.12561
Pair 2	Perceived offline examination stress risk	4.7600	150	1.64533	0.13434
	Perceived online examination stress risk	3.6867	150	1.63081	0.13316

Statistical Analysis

The data for the research was analyzed using IBM SPSS Statistics version 25.0.

Hypothesis

The following hypotheses were developed in this study to determine whether or not the null hypotheses are true.

H1: There is no statistically significant difference between student's expected online and offline examinations stress risk.

H2: There is no statistically significant difference between student's perceived online and offline examinations stress risk.

H3: There is no statistically significant difference in the marks obtained by students in the online and offline examinations.

Reliability Test

Cronbach's alpha was used to assess the reliability of the data. The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.885 [Table 2].

Expected and Perceived Stress Risk

A paired-samples *t*-test was used to determine whether there was a statistically significant mean difference between the Expected Offline Examination Stress Risk and Expected Online Examination Stress Risk [Table 3]. Participants ranked Expected Offline Examination Stress Risk higher (M = 4.7200, Standard deviation [SD] = 1.58906) as opposed to the Expected Online Examination Stress Risk (3.6800, SD = 1.53841), a statistically significant mean increases of 1.04000, 95% confidence interval (CI) [0.81192, 1.26808], t (149) = 9.010, $P < 0.001$. As, there was a statistically significant difference between means ($P < 0.05$), and therefore, we can reject the null hypothesis (H1) and accept the alternative hypothesis.

A paired-samples *t*-test was used to determine whether there was a statistically significant mean difference between the Perceived Offline Examination Stress Risk and Perceived Online Examination Stress Risk. Participants ranked Perceived Offline Examination Stress Risk higher (M = 4.7600, SD = 1.64533) as opposed to the Perceived Online Examination Stress Risk (M =3.6867, SD = 1.63081), a statistically significant mean increases of 1.07333, 95% CI [0.83098, 1.31568], t (149) = 8.751, $P < 0.001$ [Table 4]. As, there was a statistically significant difference between means ($P < 0.05$), and therefore, we can reject the null hypothesis (H2) and accept the alternative hypothesis.

Examination Marks

Paired Samples Statistics

Details		*Mean*	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	Offline Examination	5.5933	150	1.78396	0.14566
	Online Examination	6.8600	150	2.01014	0.16413

A paired-samples *t*-test was used to determine whether there was a statistically significant mean difference between the marks obtained in the offline and online examinations. Students score more in online examination (M = 6.8600, SD = 2.01014) as opposed to the offline examination (5.5933, SD = 2.01014), a statistically

Paired Samples Test									
Details		*Paired Differences*					*t*	*df*	*Sig. (2-tailed)*
		Mean	*Std. Deviation*	*Std. Error Mean*	*95% Confidence Interval of the Difference*				
					Lower	*Upper*			
Pair 1	Offline Examination-Online Examination	−1.26667	1.66957	0.13632	−0.99730	−1.53604	−9.292	149	0.000

Table 4: Paired samples test

Details		*Paired differences*					*t*	*df*	*Sig. (2-tailed)*
		Mean	*Std. Deviation*	*Std. Error Mean*	*95% Confidence Interval of the Difference*				
					Lower	*Upper*			
Pair 1	Expected Offline Examination Stress Risk-Expected Online Examination Stress Risk	1.04000	1.41364	0.11542	0.81192	1.26808	9.010	149	0.000
Pair 2	Perceived Offline Examination Stress Risk-Perceived Online Examination Stress Risk	1.07333	1.50211	0.12265	0.83098	1.31568	8.751	149	0.000

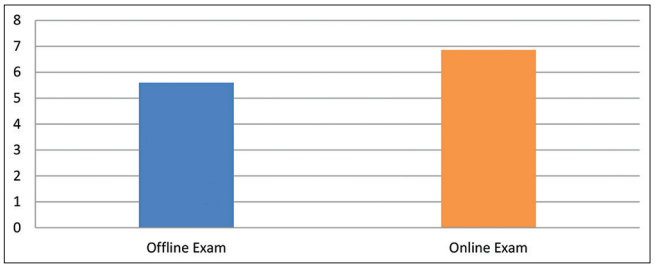

Figure 1: Mean scores comparison-expected and perceived examination risk

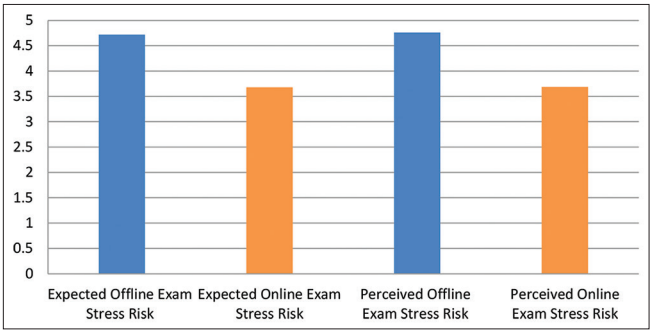

Figure 2: Mean scores comparison-offline versus online examination marks

significant mean increases of 1.26667 marks, 95% CI [99730, 1.53604], t (149) = 9.292, P < 0.001. As, there was a statistically significant difference between means (P < 0.05), and therefore, we can reject the null hypothesis (H3) and accept the alternative hypothesis [Figures 1 and 2].

Conclusions

According to the findings of this study, students expect and perceive online examination stress risk to be lower than that of offline examinations. The research also revealed that students were able to score higher in online tests than in offline examinations, implying that the department of biochemistry may conduct internal assessments, as well as implement "Competency-Based Medical Education" online.

Limitations and Future Scope

Due to the COVID-19 pandemic, the entire process of online medical education and evaluation had to be begun all of a sudden, necessitating numerous changes during the study, and in response to stakeholder demands. We intend to keep providing online help and improve it over time.

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