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Academic Stress in Physiotherapy Students: Are Open Book Examinations the Solution in the Face of COVID-19 Pandemic?

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Abstract:

Background: Due to the current COVID-19 pandemic situation many factors around us have changed. Preliminary surveys and reports have indicated this unprecedented situation is putting high academic demands and extraordinary pressure on the students. The newly introduced open book pattern of online examination which was conducted very recently definitely was a different experience for all the students as well as teachers and it also had its own pros and cons. Given the recency of this pandemic situation and pervasive use of traditional methods of closed book examination, scientific studies are lacking in this context. Methodology: It was a cross-sectional survey conducted in physiotherapy students using an online questionnaire. Through this qualitative analysis we assessed the overall impact of online examination with an aim to determine the prevalence of stress and its determinants. In addition, students' experience with respect to different phases of online examination (preparing, responding and learning) was investigated. Results & Conclusion: The prevalence of academic stress was very high (94.4%) among undergraduate physiotherapy students (n=642) in the context of online exams conducted in the pandemic crisis situation. This alarmingly high proportion of students experiencing stress warrants urgent and special attention with effective interventions. While examination related factors are identified as major stressors, many psychosocial factors are also found to exert a considerable influence on exam experience and are implicated to affect the mental health and academics of the students. Open book exam was advantageous to the students in terms of reducing stress while mixed results were found in terms of learning and study skills.

Keywords:

Online Exam, Open Book Exam, Physiotherapy Students, Academic Stress, Test Anxiety, COVID-19

1. Introduction

Physiotherapy profession education is highly demanding and challenging, rendering students to deal with a complex learning environment. Health care education can be a stressful experience for some individuals, and may affect negatively emotional well-being and academic performance of the students. Educators are increasingly concerned about the level of stress observed in students. There is substantial literature which suggests that high levels of stress and psychological morbidity occur in physiotherapy students. [1-10]

Stress is a mental or physical phenomenon formed through one's cognitive appraisal of the stimulation and is a result of one's interaction with the environment. [11,12] Feng (1992) and Volpe (2000) defined stressor as anything that challenges an individual's adaptability or stimulates an individual's body or mentality. [13,14] Stress can be caused by environmental factors, psychological factors, biological factors, and social factors. It can be negative or positive to an individual, depending on the strength and persistence of the stress, the individual's personality, cognitive appraisal of the stress, and social support.

Goodman (1993) LeRoy, (1988) stated that stressors affecting students can be categorized as academic, financial, time or health related, and self- imposed. [15,16] Academic stress refers to the experience of distress specifically with the areas related to academics which cause the student to feel overwhelmed, their life may become out of control with too much pressure, fear, panic and sometimes even somatic symptoms like pain may emerge. Academic stress can be described as a student's interactions between environmental stressors, the student's cognitive summing up of and coping with the academic-related stressors, and psychological or physiological response to the stressors. [17,18,19,20]

Some amount of stress with respect to academics can be good, called as eustress; and works to the students' benefit, for example it motivates the students to do well in their respective assignment, adds a sense of urgency so that the work is finished on time and the student performs better. [21] Many students experience a higher level of stress especially before examinations which may result in ill effects on their mental health. Test anxiety is referred to as the set of psychological and behavioral responses that accompany concern about likely negative consequences or failure of an exam or similar evaluation situations. [22] Test-anxious behavior is typically evoked when a person believes that his or her intellectual, motivational, and social capabilities are taxed or exceeded by demands stemming from the test situation. Test anxiety is a situation-specific trait that refers to the anxiety states and worries conditions that are happening during examinations. According to educational psychologists and experts in education, an average level of anxiety is useful as an effective motivational factor can enhance one's performance for more effort. However, excessive anxiety can result in different effects like disturbance of mental processes. [23] If stress and examination anxiety reaches beyond threshold level it may predispose students to various incapacitating cognitive effects like difficulty concentrating, retaining memory or recollecting previous information which further adds on to their stress. This thus prevents a student from performing up to his or her full potential which is often attributed to the fear of failure. It can also result in long lasting negative impacts such a constant fear of failure, anxiety overflowing on to other aspects of life and can also result in an overall low self-esteem. Test anxiety, consisting of affective (physiological arousal, emotionality), cognitive (worry), and behavioral

(procrastination, avoidance) components, weakens academic performance and has a detrimental effect on academic achievement and success. [24,26] Epidemiologic studies report that the magnitude of problematic test anxiety ranges from 25 to 40% in undergraduate medical students. [27,28,29]

There are multiple changes that are distinctly seen in students during such times, some of which include lifestyle and behavioral changes like lack of sleep or irregular sleeping pattern, physical and mental fatigue, irritability, restlessness sometimes even palpitations and panic attacks may occur all of which lead to further stress. [17] There can also be some psychological factors that contribute to stress such as low morale and confidence and an overall negative and/or anxious attitude. [17] Perceptions of stress were found to correlate with depression [30,32,33,34], anxiety [33,34] somatic symptoms [30], and health problems [33,35], and to predict future risk of depression [36]. Also, prolonged stress is known to cause high blood pressure, weak immune system and contributes to obesity and heart disease that are becoming more common in youth. It is very important to deal with such mental pressure in a healthy way to prevent tragic events. [17]

Students may try to come up with various coping strategies of their own to fight their individual mental battle. How students cope with stress may influence their adjustment to the learning situation and whether or not stress detrimentally affects their quality of life. While some may take external help like talking to a friend, teacher or seek some form of professional help, others indulge in recreational activities to help manage stress. [7,37] Being from the Physiotherapy discipline we also know of many physiotherapeutic techniques which could help relieve stress and also help improve concentration while studying.

Due to the current COVID-19 pandemic situation many factors around us have changed. Preliminary surveys and reports have indicated this unprecedented situation is putting high academic demands and extraordinary pressure on the students. The nationwide lockdown and imposed restrictions resulted in closure of the educational institutions. This has affected academic activities at various levels, especially the examinations that were supposed to be held across India were on a stand still. This must have resulted in a large amount of stress and anxiety amongst all students around the country due to the uncertainty of the entire situation. In order to get things going on time, the concept of online examinations was introduced. For physiotherapy students across Maharashtra, the university announced an Open Book Exam (OBE) pattern, again a pattern that was unfamiliar to the students and was being executed by teachers who were also doing so for the first time. The newly introduced OBE pattern which was conducted very recently definitely resulted in different experiences for all the students as well as teachers and it also had its own pros and cons. A large number of the students faced a number of problems such as not having access to the internet, appropriate study material and resources for appearing for the exam which may have created a sense of panic amongst them. Given the recency of this pandemic situation and pervasive use of traditional methods of closed book examination, scientific studies are lacking in this context.

This study thus aimed to assess the overall impact of online exams on physiotherapy students considering all aspects including academics, mental health and feasibility. Information was collected about various causes of stress related to online exam; coping strategies adapted by the students for the same; and how it helped them during online exams conducted amidst this corona pandemic. As indicated in the

literature we believe that there could be some positive outcomes of OBE too. Through this study we would like to determine if this format of exam was useful to students in terms of learning and whether students would be comfortable by the same pattern of exam in the future. We also sought information about various measures adopted by the institutes to help their students in such difficult times.

2. Relevance

From a general education perspective there is an ongoing movement to help students' behavior transform and adapt to new learning environments. Similarly in the current scenario of COVID-19 pandemic lockdown students must be able to assess the situation and adapt appropriately. The closed book exam is an established approach to assessment in higher education. On the other hand, the debate about OBE continues in the literature. We believe that there may be valuable insights into OBE which the educators may have dismissed in the past. Thus, this study attempts to address the gap in the literature and explore the novel experience of students with online exams. As the lockdown and other restrictions continue to extend in this unprecedented crisis, calm acceptance of new normal is the only way forward. With a widespread impact on the functioning of educational institutions in India, many schools and colleges are now seeking alternate means to conduct their operations. Along with setting up virtual classrooms and online classes, one area where there is still a scope for improvement and introduction of alternate measures is the conduct of an exam. Information obtained through this study would help us to determine the impact of online exams and guide the educators to develop appropriate strategies for the same.

This study aimed to analyze the experience of physiotherapy students with online exams conducted during COVID-19 pandemic lockdown with specific objectives outlined as

a. To assess the overall impact of online examination on undergraduate Physiotherapy students.

b. To determine if the online exam was stressful for the students. If so, (i) To identify the stressors perceived by undergraduate Physiotherapy students. (ii) To analyze the coping strategies adapted by students to deal with their stress.

Second part of the study evaluated the attitude of students towards online exams in terms of learning. This line of inquiry is designed to provide more accurate explanations for the thoughts and patterns of behavior observed during three temporal phases in the learning–testing cycle: test preparation (or forethought), test performance, and test reflection, and specifically how test anxiety influenced those patterns.

It was hypothesized that the perspectives of students would help us answer if an online pattern of examination can be implemented for physiotherapy students in future. In this article the online exams are to be interpreted in the context of a summative assessment of students towards completion of their term, conducted using an online medium remotely when the students took the exam from their homes

3. Methodology

It was a cross-sectional qualitative study conducted during COVID-19 lockdown period (June 2020). Ethical approval was obtained from the institutional review board of K.J. Somaiya college of Physiotherapy, India.

All Physiotherapy students enrolled in academic institutions affiliated to MUHS were invited to participate in an online survey. The Bachelor program of Physiotherapy at MUHS comprises 4 academic years with two institute level and one university level examination conducted every year. Undergraduate (I –IV year BPTh.) students who took an online exam as a part of their course completion during the academic year 2019-2020 were recruited. We collected qualitative responses about exam related stress at a point in time when students recently completed a college level exam and were engaged in studying for and taking university exams in the upcoming month. Participation in the study was voluntary and electronic consent was obtained from the participant. i) Any other examination pattern, ii) Online exam conducted during any other time period, iii) Students' unwillingness to participate, were set as exclusion criteria. The target population is representative of students available on social media platforms; and with and without prior experience of online exams. Sampling method was non-randomized, convenient sample. Sample size was not estimated prior to the study; however, a maximum number of participants was desirable as well as anticipated in view of relevance of this topic to students in the current situation; and the beneficial use of social media as a method of data collection.

A questionnaire was developed de-novo as a part of this study. This is a self-report measure and students were asked to reflect on their current experiences of the online exam test situation. Basic demographic details included student's academic year; information about the pattern of exam and methods employed by their institute for online exams. Academic stress was assessed from students' narratives regarding stress perceived before, during and after taking the exam. In addition, the impact of online exams on the attitude of students toward learning, study skills and exam was assessed. It has a combination of open and close ended-questions (includes multiple choice and ranking Likert-scale style questions). The questionnaire is in English language. Content validity of the questionnaire was established from two experienced teachers. The questionnaire was distributed to the participants as Google forms via social media on Whatsapp; and was emailed, if requested by them. Link to the forms was available to them for seven consecutive days. Reminders were sent to ensure maximum participation. Data thus collected was subjected to analysis.

3.1. Data analysis

All the responses obtained via Google-forms were screened. Inaccurate or incomplete responses were discarded from the analysis. The close-ended data was analyzed automatically using Google spread- sheet and descriptive statistics using percentage and frequency distribution was performed. The open-ended questions were analyzed using categorization and thematic analysis.

3.2. Results

Approximately one-third of the invited participants completed the survey. Out of the 16 colleges approached, the major responses obtained were from colleges located within Mumbai city. A total number of 642 forms were submitted and analyzed. The sample represents students from I B.P.Th to IV B. P. Th, with approximately equal distribution across all the academic years. (Figure 1)

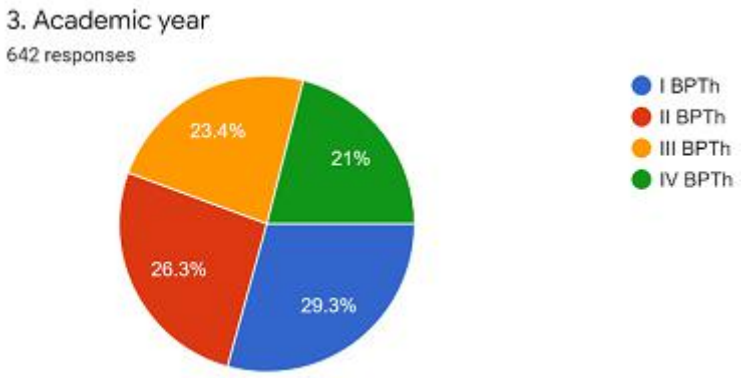

Figure 1. *Distribution of students as per the academic year*

Academic stress:

As anticipated, 94.4% students experienced stress or anxiety related to the uncertainty of exams and also mentioned that their study activities were affected during the lockdown period.

P256: *"I have started taking exams less likely and became less focused on studies during the lockdown days."*

P82: *"The focus towards studies has decreased due to crowded environment of house and lack of study material."*

Whereas some students utilized the time effectively for studies and expressed positive opinions as stated below:

P459: *"You can study at your own convenience in your own environment without getting stressed or forced to study/attend a particular number of hours per day."*

P185: *"We had more time in hand to read the reference books mentioned in our curriculum."*

Students also described the effects of anxiety on cognition. Specifically, students expressed that the ability to concentrate and the ability to remember material was affected by anxious thoughts.

Students enlisted multiple internal and external factors that made them feel stressed during preparation for the exam. (Table 1)

Table 1. *Factors identified as stressors by the students.*

Factors identified as stressors	Percentage of students
Lack of focused approach to studies during lock down	76.9
Lack of clarity of the process of exam	64.2
Lack of adequate time for preparation (less time between announcement and commencement of exam)	54.4
Inadequate study material available at home	53.1
Poor internet connectivity	49.5
Fear of performance	46.3
Online mode of exam	36.8
Lack of stationary material	23.2
Unavailability of technical device	18.4
Lack of my own technical skills	16.7
Language barrier (English mandatory due to online mode of practical	5.1

exam)	
Family issues	0.8
Emotional stress	0.3
Lack of cooperation from higher authorities	0.3
Poor efficiency of online teaching for the exam portion	0.3

P92: *"Online exam is an economical barrier as high valuable net packs are required. I am worried due to inefficient functioning of phone"*

P435: *"Fear, tension, mental stress and lack of motivation during lockdown"*

Apart from examination related factors, some psychosocial factors were adding to the fear and mental stress of the exam. Some of these were lack of a quiet environment at home (73.1%), need to take care of ailing family member (30.4%). Such concerns were expressed as:

P562: *"Studying is not possible at home between so many people."*

P93: *"You need to sit in a quiet room but not all the students have a separate room to do so."*

P378: *"If offline exams would be conducted then students who aren't residing in the nearby locality and travelling from the containment zones would not only be at higher risk but also face a number of problems such as food scarcity along with travelling issues. What if we will get infected with Coronavirus?"*

On the other hand, the **OBE format** of online examinations helped relieve stress amongst 88.6% of the students.

P623: *"Yes, since it was an open book, it was a bit relieving. If it wasn't for an OBE pattern, our morale would have been terribly down."*

P459: "*OBE was definitely a stress free exam. The difficulty level was also quite manageable."*

To deal with the stress, students attempted a number of coping strategies, the most common of which involved balancing study with fun and physical activity; and deliberate attempts to socialize with friends and family (Table 2). Students also utilized some cognitive and physical strategies. Examples of cognitive strategies were the practice of mindfulness, mental aerobics and focusing on prayer, meditation, yoga, and spirituality. 54.7% students were aware of Physiotherapy techniques that can be used for stress management and some of these students incorporated them in their daily schedule. Their exercise regime included breathing exercises, relaxation techniques, aerobic exercises, stretching and posture correction exercise, yoga, massage, thermal modalities, biofeedback, mental imagery; and also music therapy, dance therapy, etc.

Table 2. *Coping strategies taken up by the students to deal with their stress.*

Coping Strategy	**Percentage of students (%)**
Physical exercise	51.7
Yoga	26.8
Meditation	27.4
Recreational activities (dancing, reading, painting, etc.)	39.1
Peer networking	31.8
Spiritual activities	0.2
None	1.4

Among the various sources of social support, 49.7% students took help from their friends, 47.9% from family members while 17% approached a teacher. 9.2% students also needed support from a professional counselor. 4.2% were self-reliant and came up with their own way for coping with the stress. 39.3% and 35.8% found various social media platforms and google respectively were beneficial. 14.9% did not attempt any measures to reduce their stress. 38.9% had a regular mentoring program or some form of stress management programs in their institution and 26 % students found mentor's guidance was useful to them to deal with the stress in the pandemic situation.

With adoption of all these strategies and measures, 34% of the students were able to overcome the stress of the exams while 49.5% could do so only to some extent.

Online exam:

In this sample, only 25.1% of the students had prior experience of online exams, thus indicating that this pattern was a new experience for most of the students.

Table 3. *Mode of online theory and practical exams conducted by various institutes.*

Mode of theory examination	**Percentage of students (%)**
Written assignments submitted via email	64
Written assignments uploaded on google classroom	22.7
Written assignments uploaded on google drive	5.1
Online MCQ	4.5
Written assignments submitted on college website (LMS)	2.8
Mode of practical examination	**Percentage of students (%)**
Written assignments submitted via email	55.8
Written assignments uploaded on google classroom	21.3
Written assignments uploaded on google drive	3.9
Written assignments submitted on college website	0.5
Online viva voce via videoconferencing	15.7
Online Spots	0.6
Sending voice notes on Whatsapp	0.5
Practical exam not conducted	1.6

Written assignments submitted via Email was the preferred mode for conduct of theory as well as the practical exams. The online platform preferred was Google classroom followed by google drive and LMS. Written format included either essay-style or MCQ-based questions. The exams were non-invigilated and had the OBE format for the majority of the students. For the OBE, there were not any restrictions on the resources used- personal notes, course books, reference books and an internet connection to retrieve information, except for the personal help. For the majority of the students (82.1%), even the practical exams were conducted in written format either as essay-style (81.5%) or objective questions (0.6%).

With respect to provision of time & schedule of exam, sufficient time for paper writing (75.7%), paper submission (78.2%), between theory and practical exam, when conducted on the same day (64.2%), different days for theory and practical exam (61.4%) and holiday between two consecutive exams (18.4%) was reported.

Overall the experience with the process of online exams was *not good, difficult to understand and uncertain (64.2%)* reported in other words as *challenging* (43.5%), *difficult to cope with* (35%), *demanding* (23.8%), *overwhelming* (18.4%).

On the positive end, 36% of students found it as *an opportunity to learn*.

P46: *"Concept of online exams was new for everyone so it was a good experience and it's always great to learn something new."*

When stress is perceived negatively or becomes excessive, it leads to anxiety before and during examinations and ultimately affects their academic achievement. Literature shows that most students experience test anxiety during exam but when this stress interferes with the student's capacity to perform in exam adequately and express their knowledge on examinations, it becomes a problem. [38] Problematic anxiety reflected in students' exam performance during test taking itself as mentioned below:

P45: "*Anxiety increased my speed of writing; however, answers which I already knew, I was not confident at the time of writing it."*

In this view, inflexibility in delivery of the exam with respect to time and approach was perceived as adding to the stress.

P463: *"I was stressed to complete the paper on time rather than learning and attempting to my best of ability"*

For the few students for whom the exam was supervised by the teachers.

P436: "*Even looking around they consider it as copy or cheating and also you have to submit an answer paper within 10 minutes on email...which is not possible if you have internet problems".*

In the context of pandemic and lock down situation, some prevailing circumstances exerted a major influence on experience of the exams as reported below:

P48: *"I had to write an exam amid the death of a close family member which was traumatizing..mental stress wasn't a factor considered."*

P67: *"It also affected family members because for certain things like scanning papers we had to use their cell phones which caused an inconvenience for them as they too needed it for work purposes."*

P585: *"There was a lot of disturbance while writing the exams from home as a result of which it was difficult to focus."*

P106: *"Very tiring and leading to body aches because of no proper seating and writing paper in awkward posture."*

P435: *"Very stressful to write an exam due to parental pressure, especially the presence of every family member being at home."*

All these multiple factors could have led to an excessive level of arousal and potentially leaving them nervous and unable to concentrate on the test as could be explained by Yerkes-Dodson law. [39]

The study helped shed light on the various measures employed by the institutions to introduce the new format and help the students deal with the anticipated problems (table no.4)

Table 4. *Measures adopted by the institutions prior to the exam.*

Measure	Percentage of students (%)
Orientation of the exam process by the teacher	39.9
Mock exam for theory	32.7
Mock exam for practical	10.1
Checking for availability of devices or technical compatibility	32.7

Mentoring by the teacher	25.7
Provision of e-learning resources	15.4
Provision of question bank	10.9
Provision of answer key	2.5
None	21.8

With the exam conducted amid the pandemic and the online pattern of examination introduced for the first time, we analyzed the perception of students about this novel method and found mixed results:

P56:*"As we will still have to give our final exams in offline mode, taking online exams was just the need of the hour but later the exams will continue in offline mode only."*

P12: *"I believe that offline exams would be the best and should have been taken in that way only irrespective of COVID crisis"*

On the other side, with the uncertainty lingering in the mind for a long time, the exam conducted amid pandemic acted as a booster and provided direction to further studies.

P245: "Through this exam we came to know what study was pending to be learnt more."

Participants were asked if this pattern of online examination conducted during lock down will affect their performance in the forthcoming university examination. 14.5% students felt that it will have a positive effect whereas 33.6% feared that it will negatively affect their performance. 14.6% mentioned that it will not have any effect whereas 37.2% were not sure how this will affect.

56.6 % of students believed that the online exam was beneficial from a learning point of view. 3.6% of students added that this new experience improved their learning skills.

Cognitive skills - OBE promotes critical thinking and the development of analytical skills of students. Students appreciated that they learnt quick thinking, problem solving and also, to concentrate even in a house full of people.

P78: *"Questions for the online exam were more practical based due to the open book but which actually made me think.. rather than typical stereotypical questions with theoretical answers."*

P89: *"Online exams made my knowledge more clear about online studies."*

P25: *"Now when I study I remember the mistakes and points that I left in online exams."*

P623: *"It enhanced my understanding of some unlearnt content during paper discussions"*

Online exams cover important parts of each subject and offer more topics to study.

P89: *"I went through each and every chapter of the book, I learned how to find out the proper notes for every subject and topic."*

P3471: *"The assignments created during exams are helpful for future reference too"*

We asked students if they learnt any additional skills in the process of the online mode of exam. 75.8% of students denied having learnt any skills whereas some students appreciated that it improved their technical skills (9.6%), time management (6.8%), writing skills (2.2%), writing speed (2.2), multi -tasking (0.5%), etc.

Online exams increased the technical knowledge and skills related to various modes and apps, especially the Google classroom app, Zoom app, etc. and managing different online accounts. Students learned the overall process of how to use technology for examination particularly about the processes required for online submissions -scanning of documents; arranging documents and content properly; creating PDF; sending Email and other computer skills such as photo editing; typing skills; using adobe scan and google drive, etc. Students also learnt how to solve technical glitches (related to the internet speed and network issues), fast operation of technical aspects within stipulated time.

P453: "Got connected more with technology, it taught us the use of internet and other uses of the network, using web for exams"

P272: *"I learned to deal with technology for study purpose rather than always using it for the purpose of socializing"*

P23: *"I became more tech savvy. This was a good way to adopt learning in a different manner."*

With regard to OBE, it requires more time and effort during the examination. Students expressed that it was a challenge to manage time as compared to offline exams while 6.8% reported that they got better at time management for exams. Having all the information available while writing answers, for this particular format, students need to increase the writing speed and understand how much matter is needed to write for particulars. Technical process of submission of the documents within stipulated time made them write faster. Especially in the current situation with the limited study material available at home finding answers took a lot of time.

2.2% reported improved writing skills, particularly to organize the content of the answer, to write answers in more precise form, in a proper descriptive way, etc.

P436: *"Yes, probably the pattern of answers I used to write has changed."*

With regard to MCQ based patterns, mixed opinions were expressed. Some students felt MCQs are detail oriented as there was a lot to study to cover it up. Whereas others expressed that MCQ pattern doesn't actually check practical application of topics. Also, because MCQ is not the question format of university exams, students reported this was not beneficial from an exam point of view.

Students learnt how to write answers for practical oriented questions as even practical exams were conducted in written format by the majority of the institutes (82.1%). For the practical exam conducted via online viva (15.7%), students mentioned increased confidence in communicating with the teachers, and also, that they learnt to perform practical procedures with limited accessories available to them at home.

Students were asked while preparing for the online exam if they changed their approach to studies. It was reported that 30.5% of students changed their approach to studies keeping in mind the online examination pattern, while 69.5% did not.

P198: *"I don't think the approach to study had changed even if it was an OBE. It is still an exam so we had to study everything."*

P126: *"Since the pattern with online exams was the same as offline exams conducted in college, it has made no change in approach towards studies."*

Studying is just as important for an OBE as it is for a regular closed book exam. However, some students underestimate the preparation needed for an OBE. Following quote from one respondent represents the type of such thoughts described by many:

P24: *"We do not have to study the way we study for exams conducted in college"*

Many students may consider that having access to study materials with them will make it easier to answer questions in an OBE. This could be a misconception. More than just copying information straight from texts; how to locate, apply and use information is important. Even if a student does not need to memorize concepts, he/she still would still need to practice to have a proper understanding of the subject matter to be able to apply knowledge and concepts effectively in a question. One must be familiar with content and the materials and should know how to organize it for speedy retrieval in a time bound exam. Even for an OBE the textbook has to be read thoroughly enough to get answers easily, deep learning from the texts is necessary. Some students also expressed that they have become more dependent on books for studies.

Following quotes support the assumptions regarding these benefits:

P48: *"Instead of rote learning, I can focus on the concepts and application"*

P556: *"I can now understand topics in a somewhat easy way"*

Majority of students commented that they adopted a *'smarter approach to study'*.

P324: *"We had to change from the perspective of studying subjective answers into objective form, writing answers with a better content and format than in offline exams."*

P78: *"My Note making skills are enhanced, I learnt how to make notes from different sources."*

On the other hand, some students while studying were not completely understanding a topic and taking only a gist of it instead before exams.

P75: *"Since it was an OBE, many times while preparing I found it okay to skip topics that I find difficult."*

P90: *"Rather than increasing knowledge, online exams have changed the approach to studies by encouraging students to look for shortcuts and how to copy."*

P95: *"Open book format made me feel less confident about my knowledge of subjects."*

While studying independently from home, students explored the use of e-resources and the internet for studies.

P564: *"We have discovered many YouTube and other platforms that have good knowledge content."*

P345: *"Now I prefer to study and understand by using video lectures."*

P236: *"Because I did not have books at home so I had to study through PDFs and YouTube!"*

While some negative concerns were raised about using technology as below:

P45: *"Mostly we study on our phones or laptops which have ruined my eyesight."*

P287: *"We have to invest a lot of time finding material and PDFs online."*

More than anything, online and OBE pattern changed the mental status of students towards the studies and exam:

On the positive aspect it motivated them to do better (56.7%), overall improved confidence (43.6%), increased patience and ability to deal with problems (22.3%).

P324*: "Yes, it improved my learning skills."*

P624: *"Yes, I have become more confident while giving online exams."*

P497*: "Yes, it helped cope with the exam."*

P631: *"I learnt to be focused be it online exam or not."*

It's observed that the OBE format relieved exam stress and helped students cope with it but the majority of the students reported that it wasn't beneficial to them from a "study" point of view. They mentioned that it added a lot of confusion and resulted in loss of concentration and focused approach to studies for exams. All of the following quotes emphasize the negative attitude of students towards the OBE pattern.

P231: *"It made me a little careless when attempting an online exam as it was declared as an open book. I studied less compared to previous level studying for offline exams."*

P84: *"The seriousness which used to be during physical mode of examination was not in online mode exam and didn't feel like an exam.*"

P89: *"Taking exams casually, made me more dependent and carefree.*

P225: *"It has degraded my interest in studies."*

P36: *"I feel I was not honest with my own performance because exams at home definitely made everyone think that we used books for everything and that's why the marks I obtained are really depressing me and affecting my mental health."*

P552: *"Giving an open book test made me feel very low and under confident. It did not feel the way it feels for an actual exam. It was like we did a cut copy paste for answers"*

P92: *"It's more stressful than a normal exam. In fact, it has damaged our study process and made it more overwhelming."*

P45: *"I learnt the importance of normal mode of examination where I write my own remembered answers."*

P342: *"We're very confused as to how to study for such an exam especially amid a pandemic."*

These responses indicate that for some students OBE reduced self-esteem and added to the psychological distress.

When asked if students think online exams should be made a part of regular assessment of the BPTh. course, 68.8% of the students opined that it should not be while 5.5% were not sure.

P89: *"Online exams cannot determine true potential."*

P346: *"It's not a traditional method. Pen paper is still a preferable mode."*

Some students suggested a change in pattern of online exams:

P67:*"Practical exams should be taken in person."*

P93:"Should not be an OBE. (If its open book test then what's the purpose of taking exam?)"

P467: "*Should not be MCQ based."*

4. Discussion

Physiotherapy students have taken unsupervised exams from home for what could be the first time, as universities move to new ways of assessing students when the campuses are locked down to prevent further spread of COVID-19. With the current IT boom and conducting exams amid the pandemic as the need of the hour, the question of online exams has never been more relevant. The newly introduced OBE of online examination which was conducted very recently definitely was a different experience for all the students as well as teachers. Online examination is not a panacea, however, as it also has its own pros and cons. Examination anxiety is a situation-specific trait and could have affected university students differently and to a greater extent during this unprecedented situation. Online exam conducted during lockdown was stressful for the students but at the same time it helped them discover new ways of learning. To the best of our knowledge, this is the first study which explored the experience of physiotherapy students about the digital OBE delivered remotely in the pandemic situation.

So far, the Physiotherapy education system in India has remained hitherto untouched by the online exams pattern. This fundamental lacking became starkly evident when the adoption of the OBE was perceived as a complete revamp of the approach to examinations. The educators had been nervous about remotely taking online exams with the fear that students would cheat. Equal concern was that of maintaining standards of evaluation and assurance that students have met the learning outcomes in the course. As well as dealing with the academic challenges, there were extra demands on teachers for pastoral care and student welfare. Concerns were echoed among the educational authorities, in the students and teachers alike, who considered postponing deadlines until after social distancing quarantine measures were relaxed. This whole scenario resulted in uncertainty of the exams and a stressful experience for the students.

Through this qualitative analysis we assessed the overall impact of online examination among undergraduate physiotherapy students with an aim to determine the prevalence of stress and its determinants. In addition, students' experience with respect to different phases of online examination (preparing, responding and learning) was investigated.

Findings from the present study demonstrated a very high proportion of students experienced stress (94.4%) which is much higher than the prevalence reported in any other study in the medical literature. [5,40,41] It is clearly evident that a further

dimension in potential stress is added to the emotionally vulnerable population of students during the pandemic crisis situation.

Though we did not incorporate quantitative measures, students' perceptions are very informative about the nature and extent of stress they encountered. Often, we perceive undergraduate students to be academically astute and self-assured; therefore, the magnitude of stress expressed was surprising to us.

Regarding the cause of the stress, diverse factors were reported including examination related factors and environmental circumstances. These findings are in accordance with previous studies which highlighted factors related to academics as the major stressors in physiotherapy students followed by other stressors such as personal, psychosocial, emotional or financial factors [3,4,5,37,42]. Lack of focused approach to studies, lack of clarity with the process of OBE format, time constraints along with fear of performance were perceived as major stressors during preparation of the exam. In order to help them learn, students identified a need for clear expectations, clear briefs and clear assessment criteria. Sambell et al. [43] stated that from the student perspective the issue of fairness of assessment is important supporting other studies [43,44] which emphasize that openness and clarity are fundamental requirements of a fair and valid assessment system. In the present study, the arguments of students reflect their beliefs about the fairness of new assessment mode and lack of control over the evaluation process.

Downside of online assessment includes its costs and its inherent reliance on technology, which is sometimes unreliable. Many students reported issues with availability of digital devices and internet connection and their own technical incompatibility. While giving exams from home, they faced challenging learning circumstances such as lack of proper study environment at home, lack of books and other learning resources, lack of personnel by the side with the capacity to help with technical problems, etc. The students from such disadvantaged backgrounds expected that their needs should be supported; and perceived lack of cooperation from higher authorities as a cause of their stress. Lack of completion of syllabus, dissatisfaction with online teaching and no practice for practical exams were additional factors.

It is worth highlighting that during the lockdown situation, in addition to the academic demands and pressures, students are subjected to other kinds of stressors such as social adjustment, interpersonal and family problems, uncertainty of future, lack of social outgoing activities, coping with the high stimulating environment of the pandemic, domestic work load, financial concerns, etc. Students were required to adjust to the challenges of the academic environment and subsequently found difficulty in balancing it with their personal lives. All these stressors can affect a student's learning capacity, academic output as well as their day to day adjustment process.

Sound mental health is a prerequisite for any kind of academic achievement. The well-established relationship between stress and performance is explained in psychology literature by the Yerkes-Dodson law. [45] Explained in other words as inverted U model, it emphasizes on the importance of an optimal level of stress and further states that an insufficient level of arousal reduces engagement with work and is detrimental to productivity whereas increasing stress beyond optimal may feel counterintuitive. [45] Similarly it was observed in this study that OBE format reduced exam stress to a point where students became carefree and unproductive in studies, whereas on the other hand stress to a point of overwhelming anxiety affected their

studies and exam performance. Cognitive interference has been a traditional interpretation of the cause for reduced performance in the presence of test anxiety. Classic models of test anxiety proposed that students engaged in self-critical thinking, irrelevant thoughts, or worry had an over-abundance of cues available to them at the time of the test [46-48]. Interfering thoughts that arise during test preparation can impair knowledge and conceptual understandings for content, leading to eventual failure on subsequent assessment tasks. [25,49] This broader view is attentive to the notion that students with high-test anxiety hold perceptions and engage in behaviors at all phases of the learning–testing cycle that are associated with eventual performance decrements. Continued psychological distress could cause academic burnout, a state of emotional exhaustion which results in students experiencing emotions of decreased personal achievement and disinterest in studies, further negatively impacting academic learning. [50,51] Test anxiety may also jeopardize assessment validity in the cognitive domain and constitute a major source of 'test bias', in that anxious examinees may perform less well than their ability and skills would otherwise allow.

Excessive or unconstructive stress pooled with other psychological factors may lead to further psychological complications causing psychological morbidity and also threaten physical well-being. This preliminary study emphasizes that there is a dire need to identify the different stressors and to cater to the practical needs of the students in this unprecedented situation. While personal causes of stress may be difficult to control, manipulation of curricular factors may have positive effects on academic sources of stress.

In the current higher education environment there is a drive towards the development of greater independence and personal reflection requiring students to take ownership of their learning. In order to do so, it is important that they are able to adopt appropriate coping strategies. Present study findings are in accordance with previous studies wherein students attempted multiple strategies, most of which were active and positive. [3,37,52]. In contrast to some studies, none of the students reported negative strategies such as alcohol/substance use and self-blame. [37,53,54] However, we could not rule out under reporting of such behavior by students in spite of assurance of anonymity and confidentiality of their responses by the investigators involved in the present study. One of the main coping strategies utilized by health care students is 'talking to someone'. [55-59] In this study, friends and family members were the frequently reported sources of social support by the students and indicates that the stress they experienced could have been emotional in nature. Also, it is likely that students with academic difficulties approached a teacher indicating that their stress could have been of academic nature. External support structures for university students are widely described in literature and can be divided into academic support) [60, 61], emotional support [62] or an integration of academic and emotional support through mentoring. [63] Our findings are in accordance with previous studies which describe emotional support structures are more frequently utilized than academic support structures by university students. [53,63]

Overall, students' explanations of their experiences with exam stress and strategies they tried for managing it suggest possible inefficiencies and less adaptive outcomes. Students may have expended too much energy and resources on managing anxiety through preparation up to the day of exam, during a period when time and energy are typically 'at a premium'. This observation again reflects the impact of the taxing pandemic situation and suggests several implications for intervention. Rather than students left to their own devices to deal with the stress, the advisors to these students

could be a vital resource by assisting in the assessment of stress and introducing them to effective strategies. By replacing the longer menus of strategies by one or two approaches per student that address the core causes and most debilitating effects of stress, students may find both a level of relief and more time to prepare for the exams efficiently. In particular, students' perceptions and behaviors related to educational assessment may be optimized through a program that involves (a) effective goal setting, (b) test preparation skill development, (c) scaffolding for students as they prepare for exams, (d) emotional or motivational support from peers or instructors, (e) helping students develop and maintain realistic performance attributions, and (f) training on emotional self-regulation during stressful experiences. This further supports the need for stress management policies with an integrated structure which includes academic and emotional support such as a full-time academic mentor along with debriefing sessions and can be considered by the institutes to enhance the psychological wellbeing and learning abilities of the students. Doing this in the context of a course might result in students' mutual support in their encounters with stress.

Different institutes did run their pattern of examination independently, considering all the alternatives which will work the best. Majority of the institutes employed a flexible approach, which was a crucial factor to the implementation of this new system. OBE format relieved stress amongst the majority of the students which is in accordance with previous studies. [64,65] In addition, institutes employed various measures to help their students in all the ways possible. They conducted orientation sessions and mock online exams to familiarize the students, offered mentoring sessions and also provided learning material to the students. Inflexibility, especially in terms of provision of time, on the other hand, was perceived as adding to the exam related stress of the students.

Higher education is supposed to equip the students with intellectual abilities and skills. One certain development in assessment in medical education is a move towards the philosophy of assessment for learning. [66] Research shows that open-book, open-web examinations are a step toward student-centered and constructivist learning [67] and they tend to encourage creative thinking.[68] In the medical curriculum, OBE offer tests on higher levels of complexity and applications in the real world.

The conventional method of learning relies heavily on mechanical repetition and memorizing of the textbook information. OBE nullify these demerits of conventional education by providing a student access to the study materials while they take the exam. In OBE, since students do not have to focus on memorizing, they can instead spend the time on actually understanding the subject and improving their conceptual knowledge. OBE tests students' ability to quickly find relevant information and then to understand, analyze, apply knowledge and think critically. Thus, it can be argued that OBE give an actual evaluation of how much a student has learned during a course. In the present study, OBE format made the students have wider reading of the textbook, knowing the structure of the textbook as a learning resource, and deeper understanding of the concepts and principles. OBE encouraged active engagement of students in learning and boosted their confidence to work through difficult concepts.

One of the features of online assessment is illumination of areas of weakness-this has a meaningful dimension of both learning and evaluation that enables the learner to demonstrate competence. The analysis of the results of OBE is very beneficial to teachers. Since OBE provide a good depiction of how much a student has understood

a subject, teachers can check whether their students have a clear knowledge of the subject and thus can give the feedback accordingly. Online examinations facilitate the opportunity to receive feedback [69], which might raise students' self-efficacy beliefs and through them their academic performance. Studies examining students' experiences in class and online examinations with MCQ show that online settings, where the students received immediate feedback, reduced stress and allowed them to focus on learning [70]. Provision of feedback on assessment was considered a valuable form of support for learning. [71]. Similar findings were observed as participants viewed feedback of the assessment was effective for learning and critical to build their self-confidence.

However, it is observed in this study that in the online assessment, paper-based assessments were largely transferred unchanged to a website, therefore text and simple assessment formats dominated. The open-book method employed in the current study as such, at least with MCQ, does not seem to promote students' learning. These findings are consistent with those reported in previous studies [72-74] found that students were more inclined to employ surface approach in preparing for a multiple choice test requiring low levels of cognitive processing, whereas an essay assignment requiring high levels of cognitive processing prompted a deep approach. Also, the aid of technology in the online medium and internet enables many more features than paper allows. Currently, online assessment is usually used to assess knowledge (ideally, applied knowledge); however, newer technologies enable the assessment of simulated clinical skills online and also real-time communications technology (for example, Zoom, Skype) enable viva voce or actual clinical examinations to be conducted online. Assessments measuring competencies needed in real-life motivate students to adopt deep learning strategies. [75] In this study, teachers could have adopted MCQ based pattern and written format for practical exams because it is convenient, quick and allows automated testing possible. It can be expected that as the teachers become more familiar with the use of online assessment, content of online examination will change and the repertoire of assessment methods will expand. They will make more use of the benefits that technology and the internet can offer and these features will be increasingly exploited in the future.

Students' perceptions of assessment influence their approaches to learning and vice versa. [76,77] In the present study, consequently, the majority of the students reported no perceived benefits in terms of learning or change in study approach for exam preparation. Some students, however, may have perceived the online exam as authentic and reported a positive impact on their learning. They employed deep learning strategies and also noticed an increase in generic skills achievement such as problem-solving, analytic skills, and written communication skills. These findings are in accordance with previous literature [75] and support the claim that open-book examination should demand higher order cognitive processing in terms of Bloom's taxonomy [78] (e.g. evaluating and creating) compared to traditional closed-book examinations which typically focus on lower order cognitive processing, such as reproduction and description. In support of Biggs and Tang's (2007) [79] theory of constructive alignment, intended learning outcomes, teaching methods, learning activities, and assessment methods should be in alignment with each other.

It was observed that some students adopted different strategies for preparation of the exam and also changed their overall approach to studies post exam. Approaches to learning involve both a particular strategy and a motive: for instance, a student may use a deep strategy (to integrate knowledge) in order to understand (deep motive) or a

surface strategy (to rote learn) in order to pass the test (surface motive). [80] Students also might switch flexibly between approaches and use the approach which is more appropriate in a specific context, namely, use a strategic approach. Approach to learning is a function of both the learning orientation and perceptions of the task requirements; for instance, a heavy workload and threatening situations increase the adoption of surface approach .[80] Usually, students prefer examinations which fit to their learning approach.[76] Karagiannopoulou and Milienos (2013)[81] compared the preference of essay-type closed-book and open-book examinations and found that open-book examinations were preferred by students who tend to employ deep strategy but appear to be unorganized in their study in the same ways as students who tend to adopt surface approach.

Overall experience with the online exams was not good. Such feelings of inadequacy could be stemming from limited knowledge of, or improper training with, online exam patterns and may be negatively influencing the attitude of some students. One reason why students are opposed to the implementation of online or OBE per se is the general lack of understanding and misconceptions prevalent about OBE. Students who are used to conventional approaches towards learning, the concept of OBE may seem absurd, stemming from the unfamiliarity with the process. Some may even argue that this type of an exam does not make any sense and beats the whole concept of evaluation of student's learning through means of conducting an examination. It can be stated that online book exam changed the preconceived notion of exam as challenging; while the stress of the exam was reduced, it did not help them to improve their study skills.

While asked in the context of new-exam taking, the majority of the students opined that it will negatively affect their performance in the forthcoming university exams while many others were uncertain. Apart from the experience of online exams which crucially determined this effect, another important attribute to consider is self-efficacy. The impact of test anxiety during the test reflection phase is generally driven through attributional biases that lead to future test-related perceptions and behaviors. One likely process through which these attributions impact future performance is through declining self-efficacy ratings developed in response to failure. [82] Self-efficacy, the context-specific belief that one can perform successfully, is lowered, for instance, by emotional arousal and tension.[83] For some students OBE format reduced self-esteem, led to personal devaluation and added to the psychological distress and thus could have thus affected their self-efficacy. Self-efficacy is known to predict the learning strategies, test anxiety, and academic achievement. [84]

One of the strengths of this study was the large sample of participants—which provided sufficient power to address our study aims. However, we acknowledge several limitations. For example, all measures utilized were based on self-report, which may be prone to reporter bias. The potential socio-demographic and student-related characteristics which are established to be associated with examination stress were not assessed in the present study. Especially, to consider are gender, academic year, amount of social support, exam factors such as theory versus practical exam; and students' behavioral, psychological and academic characteristics, e.g. high achievers versus low achievers. [85-96] The magnitude of test anxiety is meaningfully related to students' perceptions and behaviors towards study skills.[25] The present study did not compare high versus low anxiety participants. It is known that effects of test anxiety had to do with stressors on emotional or mental well-being, cognitive functions, and physical well-being. [3,24,25] The present study did not analyze the

pre-existing psychological comorbidities and its effect on physical well-being. Owing to the complex interaction of the multiple factors influencing students' experience during lockdown we cannot separate the individual contribution of each factor. Exam as a contributor to stress, academics and other issues thus needs to be interpreted in a broader context. Also, the cross-sectional nature of the study precludes causal inferences on the associations and limits the possibility to determine changes over time in all these variables. We recommend future longitudinal studies to further explore this dynamic relationship.

5. Conclusions

This study showed that the prevalence of academic stress was very high (94.4%) among undergraduate physiotherapy students in the context of online exams conducted in the pandemic crisis situation. This alarmingly high proportion of students experiencing stress warrants urgent and special attention with effective interventions. While examination related factors are identified as major stressors, many psychosocial factors are also found to exert a considerable influence on exam experience and are implicated to affect the mental health and academics of the students. OBE was advantageous to the students in terms of reducing stress while mixed results were found in terms of learning.

6. Implications

The narrative perceptions of our students have made us aware of the intensity and commonly experienced nature of academic stress. As an educator, it's imperative to monitor prevalence of stress among students and provide professional help to cope up with the stressors. Any 'empty advice' we might have given 'not to worry, you will do fine' will certainly be replaced with more thoughtful discussions on the causes, effects, and management of their examination anxiety in the future. Proper guidance, advisory services, counseling, support groups, review of academics, and exam schedules, regular sessions on time management and stress management by experts, healthy leisure activities, extra or co-curricular activities and better interaction with the faculty can do a lot to reduce the stress. Assets to be emphasized in various coping strategies include skills such as communication, behavioral techniques, value clarification, decision making and life skills related to stress management. The goal of stress management should not be to shelter students from situations that give rise to stress but to tackle them in a strong and positive manner. Replacing stressful challenges with positive coping strategies offers a potentially powerful tool to build self-efficacy and cognitive control as well as greater self-awareness as a learner and future health practitioner.

Online learning has become the new standard for education in just a few days, however students and teachers are not familiar with this concept. This means that it will take some time for both to adapt if the new format is implemented. However, since alternate methods are already being searched during the time of the pandemic, OBE have become very viable. At this juncture, OBE can play a significant role in reforming the education system. Before it is widely implemented, it needs an understanding on the part of the examiners, teachers and students. Careful setting of the question papers and evaluating the answers is required in OBE. Regular questions that we are generally used to do not work well with OBE. Students are also required to have good writing skills in order to portray their knowledge. Equal availability of resources has to be ensured in OBE. Since some students may not have access to the

same quality or quantity of study materials as others, there is bound to be some discrepancy when it comes to the equal availability of resources. Information obtained from this study will serve to guide the educators to develop more effective strategies and student skills required for online exams so as to enhance the educational outcomes. Also, this study serves as a benchmark for future research to explore in more detail the multi-directionality of causal pathways, and the multiplicity of mediators linking test-anxiety to learning and achievement. Furthermore, research should transcend academic stress and explore students' individual affective life analyzing other learning-related and achievement-related emotions, including positive emotions as well. In addition, more studies on educational strategies to prevent academic stress are needed.

OBE is an uncommon concept and students are not very familiar with it. However, it does have the potential to change education as we think of and move it towards being more analytical and understanding-based in nature. While there are some very valid concerns against the widespread implementation of OBE, it can be argued that OBE give an actual evaluation of how much a student has learned during a course. OBE are a radical and forward-thinking measure in education and thus need further exploration in Physiotherapy discipline. If we show it has behaved in a similar way to a close book exam, then that will begin a new era for medical assessment. Specifically, at a time when social distancing measures may extend in near future too and difficulties are anticipated in delivering a full curriculum, we propose that open book assessment approaches may help to free up the curriculum as students become less reliant on memorizing facts. As part of a balanced assessment strategy it may be necessary and timely to adopt OBE. Further threads of discussions regarding online and open book exams will be interesting to follow.

Abbreviations

PT: Physiotherapist

BPTh: Bachelors of Physiotherapy

OBE: Open Book Exam

MCQ: Multiple Choice Questions

MUHS: Maharashtra University of Health Sciences

COVID-19: Coronavirus Disease- 2019

LMS: Learning management system

IT: Information Technology

PDF: Portable Document Format

Conflicts of Interest

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