Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i7.6970

EVALUATING THE IMPACT OF RELAXATION METHODS ON REDUCING ACADEMIC-RELATED STRESS IN HEALTH SCIENCES STUDENTS

Sobia Hasan, PhD (scholar), MPhil[1*], Tehreem Anis, PhD (scholar), MPhil[2], Hina Saeed, MSCPT[3], Alliya Batool Haidery, MSCPT[4], Ghousia Shahid, MSCPT[5], Rabia Intikhab, MSCPT[6]

[1*]ASSISTANT PROFESSOR - DEPARTMENT OF PHYSICAL THERAPY IQRA UNIVERSITY-NORTH CAMPUS, Email Id: sobia.hasan@iqra.edu.pk, ORCID ID: https://orcid.org/0000-0002-2111-5507 .
[2]ASSISTANT PROFESSOR - DEPARTMENT OF REHABILITATION SCIENCES Pakistan Institute of Rehabilitation and Medical Sciences, Karachi, Pakistan, Email Id: tehreemanis@gmail.com. ORCID ID: https://orcid.org/0000-0001-6425-5019.
[3]LECTURER - DEPARTMENT OF PHYSICAL THERAPY IQRA UNIVERSITY-NORTH CAMPUS, Email Id: hina.saeed@iqra.edu.pk, ORCID ID: https://orcid.org/0000-0001-9256-3537.
[4]CEO Pakistan Centre for Autism, Email Id: alliya.haidery@gmail.com
[5]Sr. Assistant professor, Bahria University College of Physical Therapy, University health sciences campus, Email Id: ghousia.bucpt@bahria.edu.pk, ORCID ID: https://orcid.org/0000-0001-6078-2735
[6]Senior Lecturer, Hamdard College of Rehabilitation and Allied Health Sciences Hamdard University, Email Id: rabia.intikhab@hamdard.edu.pk, ORCID ID: https://orcid.org/0009-0003-6637-9105.

[*]**Corresponding Author:** Sobia Hasan, PhD (scholar), MPhil
[*]ASSISTANT PROFESSOR - DEPARTMENT OF PHYSICAL THERAPY IQRA UNIVERSITY-NORTH CAMPUS, Email Id: sobia.hasan@iqra.edu.pk, ORCID ID: https://orcid.org/0000-0002-2111-5507 .

ABSTRACT

INTRODUCTION: This research mainly emphasizes on academic induced stress faced my students of health sciences. Stress is a natural response to noxious stimulus, which significantly impacts the individuals as well as society, leading to adverse consequences comprising of medical dropouts, marital/relationship issues and many challenges in the healthcare setup as well. Examining the prevalence of stress among students of health sciences, this study emphasizes on the immediate strategies for stress management. By applying relaxation techniques including Progressive Muscle Relaxation and deep breathing exercises as ways to overcome stress and as well improve the mental and physical well-being of students going through it.

AIM OF STUDY: The aim of this study to evaluate the efficacy and effectiveness of relaxation techniques in reducing academic-induced stress among students of health sciences.

METHODOLOGY: A study was conducted using a quasi-experimental design, employing a one-group pre-test post-test methodology to achieve its objectives. The research involved gathering data from 76 undergraduate students enrolled across various departments of University. These students ranged from first-year to fourth-year participants. The pre-test assessment included demographic

information and the Perceived Stress Scale (PSS). Among the 76 students, 52 actively participated in the sessions, while 24 did not. Following a month, the same scale was used for the post-test assessment. A paired t-test was utilized to compare the pre-test and post-test scores, analyzing the impact of the PMR technique.

RESULT: Finding of study showed that among 52 students majority of the sample reports "Moderate Perceived Stress," constituting 75.0% of the respondents. A smaller proportion of respondent's report "Low Perceived Stress" (15. 4%).An even smaller proportion reports "High Perceived Stress" (9.6%). The significance level ($p = > 0.05$) shows that with a p-value of 0.234, there is not enough evidence to conclude that there is a significant linear relationship between Pre and Post Intervention PSS.

Study revealed that there is slight decrease in perceived stress after intervention of progressive muscle relaxation with deep breathing.

CONCLUSION: Progressive muscle relaxation technique with deep breathing is found to be effective in reducing perceived stress among. Health science students. There is a slight decrease in perceived stress after the intervention. This study suggests a potential positive impact of the intervention on perceived stress levels.

KEYWORDS: Academic Induced Stress, Health Sciences students, Perceived Stress Scale, Progressive Muscle Relaxation (PMR), Relaxation Techquine.

INTRODUCTION

Background/History

Stress is an adaptive response to noxious stimulus causing disturbance in normal functioning. Academic examination stress is an inevitable feature of student's life where periodic exam acts as an acute stressor. [5]

The Increasing worldwide concern of suicide, particularly among adolescents and younger individuals aged between 19 to 24, underscore for immediate need for effective stress management strategies. The results are extremely alarming which suggests that suicide claims a life after every 40 seconds with half of these cases involving individual aged under 45, men aging between 15 and 29 having a higher prevalence. [1]

Stress significantly influence individuals and society, contributing to adverse consequences comprise of medical dropouts, heightened suicidal tendencies, marital issues, reduced work productivity, burnout and challenges in healthcare system. [4]

Academic stress in exams serves as a significant stressor in student's life. According to research academic stress put forward high stress levels resulting in reduced learning and performance levels among students. Notably, medical students experience exam stress, with reported perceived stress prevalence ranging from 27-73% [2]

Medical undergraduates experience high stress levels (25-90%), moreover with reports of psychological stress of 57% in USA, and in Saudia Arabia of 63.8%, while Pakistan has alarming figures of 90%. Coping strategies comprise of daily exercise, meditation, relaxation techniques, structured breaks and innovative approaches of nearly 75% of students satisfied with their chosen methods. [3]

Prevalence

The prevalence of stress of physiotherapy students in Pakistan among the participants was 11.5% from Karachi University, 55% from Ziauddin University and 33.3% from Jinnah Post graduate Medical Centre (JPMC). [4]

According to physician Edmund Jacobson theory of Progressive Muscle Relaxation introduced in 1920s, stress relates to muscle tension [5], according to him relaxation technique lowers muscle tension stating that a relaxed body promotes a calm mind. The technique involves deliberately tensing and then relaxing muscles in order to alleviate stress symptoms. Each muscle or its group is tensed for 5-7 seconds and relaxed for 20-30 seconds. [1]

Effects of Exercise

Relaxation reduces pain perception and as well as tension, which creates a pleasant mental state, it reduces response to stress, increase in parasympathetic activities and knowledge concerning muscle tension as well as autonomous stimuli. It results in improving concentration, increasing feeling the of control, improves the ability to block inner talk, energizes and improves sleep. Decreases the cardiac index, lowers blood pressure, warms or cool body parts, enhancing physical activity performance which improves quality of life. [5]

Deep breathing is another method widely used in Japan in order to reduce tension and mood. [5]

Deep breathing, which is also known as diaphragmatic breathing, is a technique to contract the diaphragm slowly inhaling and exhaling. It is responsible to boost oxygen levels, massage inner organs located in or close to the abdomen, possibly stimulating the Vagus nerve. [6]

It emphasizes on 3 key physiological systems in stress and relaxation, the autonomic nervous system, the endocrine system and the skeletal muscle. Together both these systems prepare the body for stress, encourage relaxation and regulate response to stressors [7].

Hypothesis

The implementation of Progressive Muscle Relaxation techniques will significantly reduce academic induced stress among Students of health Sciences.

Objective

The aim of this research study is to investigate and evaluate the effectiveness of progressive muscle relaxation and deep breathing exercises in reducing academic induced stress among Students of Health Sciences.

Rationale of Study

The study's motive is to investigate the efficacy of relaxation techniques in academic induced stress among Students of Health Sciences. Understanding the effective stress management strategies is critical in order to deal with the potential impact of stress on academic performance and as well as mental well-being. This study aims to fill that gap by exploring how relaxation techniques can be beneficial for students who are suffering from it. The findings are expected to contribute to the development of targeted interventions and as well as improved mental health outcomes in order to promote academic success among students of health sciences.

Method and Material:

Study Design:

A quasi-experimental design employing a one-group pre-test post-test methodology was utilized to fulfill the objectives of this study.

Study Setting:

The study encompassed undergraduate students across various departments, namely Physical Therapy, Human Nutrition and Dietetics, Pharmacy, and Nursing at Iqra University's North Campus, spanning from first-year to fourth-year students.

Sampling Technique:

A non-probability purposive sampling technique was employed to select the study samples.

Duration of Study:

Six month after the approval of synopsis.

Sample Size:

The study comprised a sample size of 52 participants.

Inclusion criteria:

- The inclusion criteria comprised undergraduate students enrolled in the departments of Physical Therapy, Human Nutrition and Dietetics, Pharmacy, and Nursing at Iqra University's North Campus.
- The study encompassed students from the first year to the fourth year across these departments.

Exclusion criteria:

- Postgraduate students and those not enrolled in the departments of Physical Therapy, Human Nutrition and Dietetics, Pharmacy, or Nursing at Iqra University's North Campus were also excluded from participation.
- Additionally, students outside the specified academic years (1st to 4th year) were not included in the study cohort.

Parameter of Assessment:

The parameters for assessment derived from the pretest questionnaire include:

- Assessing stress levels both before and after any potential intervention.
- Evaluating academic performance indicators to gauge stress's impact on academic achievements.
- Exploring physical and mental health aspects influenced by academic stress.
- Analyzing participation rates and engagement of participants in the study.
- Collecting demographic data to discern variations in stress levels among different student categories.

Instrument:

The initial session involved collecting background information from participants using a demographic data sheet, covering details like age, marital status, and medical issues (1)(2). The second part included administering the Perceived Stress Scale (PSS), a 10-item questionnaire measuring stress on a five-point Likert scale. The PSS reveals a two-factor structure: 'general stressors' and 'the ability to cope.' The total score, ranging from 0 to 40, indicates the perceived stress level, with 40 reflecting the highest stress. Reverse coding was applied to items 4, 5, 7, and 8, as they were positively stated (2).

Intervention Procedure:

Progressive Muscle Relaxation (PMR) is a widely used technique for promoting relaxation and reducing stress. It involves systematically tensing and relaxing various muscle groups with deep breathing, fostering awareness of muscle tension. This method helps individuals release tension, leading to a profound sense of calm. Below is a guided PMR session that incorporates deep breathing to enhance the overall relaxation experience.

- **Forehead:**
- Squeeze the muscles in your forehead for 15 seconds.
- Slowly release tension over 30 seconds.
- Notice the difference in muscle feel as you relax.
- Breathe slowly and evenly.
- **Jaw:**
- Tense jaw muscles for 15 seconds.
- Gradually release tension over 30 seconds.
- Observe the feeling of relaxation and maintain even breathing.
- **Neck and Shoulders:**
- Raise shoulders towards ears, holding for 15 seconds.
- Release tension slowly over 30 seconds.
- Feel the tension melting away.
- Continue with slow, steady breathing.

• **Arms and Hands:**
• Draw hands into fists and pull towards chest for 15 seconds.
• Slowly release tension over 30 seconds.
• Notice the relaxing sensation.
• Maintain a calm and even breath.
• **Buttocks:**
• Increase tension in buttocks over 15 seconds.
• Slowly release tension over 30 seconds.
• Observe the tension melting away while maintaining steady breath.
• **Legs:**
• Increase tension in quadriceps and calves for 15 seconds.
• Squeeze muscles as hard as possible.
• Gently release tension over 30 seconds, feeling relaxation.
• Continue deep, rhythmic breathing.
• **Feet:**
• Increase tension in feet and toes gradually.
• Tighten muscles as much as possible.
• Slowly release tension over 30 seconds, experiencing total relaxation.
• Maintain the soothing rhythm of deep breathing throughout the process.

Study Protocol:
The study began with a counseling session, clarifying objectives and instructing students on applied techniques. Consent was obtained from two classes daily. Following counseling, participants received a pretest Performa. Three sessions on consecutive weeks applied Progressive Muscle Relaxation (PMR) with Deep Breathing, each lasting 25-30 minutes. A follow-up session occurred in the last week. Out of 76 students, 52 attended, while 24 did not. The 52 students who participated completed a post-test Performa using the same assessment scale.

Result

	Frequency	Percent	Valid Percent	Cumulative Percent
Gender				
Male	10	19.2	19.2	19.2
Female	42	80.8	80.8	100.0
Age Status				
Less than 20	21	40.4	40.4	40.4
More than 20	31	59.6	59.6	100.0
Major program				
DPT	38	73.1	73.1	73.1
HND	6	11.5	11.5	84.6
Pharm D	7	13.5	13.5	98.1
Nursing	1	1.9	1.9	100.0
Year of Study				
1st Year	17	32.7	32.7	32.7
2nd Year	5	9.6	9.6	42.3
3rd Year	6	11.5	11.5	53.8
4th Year	24	46.2	46.2	100.0
Total	52	100.0	100.0	

Table 1: Demographic representation of studied sample n=52

Table 1 and figure 1 indicate that the majority of the sample is female, with 80.8% of the respondents identifying as female. The male category represents 19.2% of the sample.
The majority of the sample is classified as "More than 20," with 59.6% of the respondents falling into this category. The "Less than 20" category represents 40.4% of the sample.
The data revealed that the majority of the sample is enrolled in the "DPT" program, with 73.1% of the respondents belonging to this category. The "HND" category represents 11.5% of the sample. The "Pharm D" category accounts for 13.5% of the sample.
The interpretation suggests that the majority of respondents are in their 4th year (46.2 %,) while the 1st year (32.7%) also has a significant representation. The"2nd Year" (9.6%) and "3rd Year" (11.5%) categories have smaller proportions in the sample.
The cumulative percent for each category increases as you move down the table and reaches 100.0% at the total row, indicating that all cases are accounted for.

Prevalence of Stress

Table 2: represents Prevalence of pre level of Stress

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Perceived Stress	8	15.4	15.4	15.4
	Moderate Perceived Stress	39	75.0	75.0	90.4
	High Perceived Stress	5	9.6	9.6	100.0
	Total	52	100.0	100.0	

Table 2 represents the report on prevalence of stress before intervention among 52 students.
Above result revealed that the majority of the sample reports "Moderate Perceived Stress," constituting 75.0% of the respondents. A smaller proportion of respondent's report "Low Perceived Stress" (15. 4%).An even smaller proportion reports "High Perceived Stress" (9.6%).

Post Level of Stress

TABLE 3: represent the Post Level of Stress of studied sample.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Perceived Stress	4	7.7	7.7	7.7
	Moderate Perceived Stress	48	92.3	92.3	100.0
	Total	52	100.0	100.0	

This table 3 indicate that the majority of the sample reports "Moderate Perceived Stress" after the intervention, constituting 92.3% of the respondents. A smaller proportion of respondents reports "Low Perceived Stress" after the intervention (7.7%).

Paired Samples Correlations

TABLE 4: represent the Paired Samples Correlations of pre and post intervention PSS.

	N	Correlation	Sig.
Pre_Intervention_PSS & Post_Intervention_PSS	52	.199	.158

Table 4: The correlation coefficient (0.199) between pre- and post-intervention PSS scores is positive, indicating a weak positive relationship. However, the significance level (0.158) is greater than the typical alpha level of 0.05, suggesting that the correlation is not statistically significant.

Paired Samples Statistics

TABLE 5: represent the Paired Samples statistics of pre and post intervention PSS.

	Mean	N	Std. Deviation	Std. Error Mean
Pre_Intervention_PSS	18.8077	52	5.86795	.81374
Post_Intervention_PSS	17.7500	52	3.82907	.53100

Table 5 the above result revealed that the mean Pre Intervention PSS score is 18.81, indicating the average perceived stress level before the intervention. The standard deviation (5.87) suggests variability around the mean, indicating the spread of individual scores. And the mean Post Intervention PSS score is 17.75, indicating the average perceived stress level after the intervention. The standard deviation (3.83) suggests variability around the mean, with less spread compared to the pre-intervention scores

The mean post-intervention PSS score (17.75) is lower than the mean pre-intervention PSS score (18.81), suggesting a potential reduction in perceived stress after the intervention.

The standard deviation for Pre Intervention PSS is higher than that for Post Intervention PSS. This may indicate greater variability in perceived stress scores before the intervention.

The reduction in the mean score and standard deviation in post-intervention scores suggests a potential positive impact of the intervention on perceived stress levels.

This suggests a slight decrease in perceived stress after the intervention.

Paired Sample Test

Table 6: represent Paired Sample Test

Paired Samples Test								
	Paired Differences					t	df	Sig.(2-tailed)
	Mean	Std.Deviation	Std.Error mean	Interval of the lower	upper			
Pre_Intervention_PSS Post_Intervention_PSS	1.05769	6.33822	.87895	-.70688	2.82226	1.203	51	.234

The significance level (p = > 0.05) shows that with a p-value of 0.234, it is not statistically significant at the 0.05 level. This means that, according to the sample data, there is not enough evidence to conclude that there is a significant linear relationship between Pre and Post Intervention_ PSS.

DISCUSSION:

The results of our study showed that the 52 participants who agreed to participate in the consent form and filled the baseline proforma are as mentioned in above result. In line with the results of our result, similar results were reported in the study conducted by Gustainienė L, Perminas A, Pečiulienė I, et al in which that HR comparing relaxation with no relaxation, scores declined in a different way depending on the type of relaxation. Contrast 2 did not reveal statistically significant differences between progressive muscle relaxation and biofeedback-assisted relaxation F (1, 4760) = 1.999, p = .163, partial eta squared = .038. (20)the result supports the finding that demonstrate both PMR and biofeedback-assisted relaxation decrease HR scores in a group of subjects with higher scores of neuroticism. Similar results were also observed in the students who were studying social and political sciences(16) were younger than the students in other major study groups (55.7% of all students between 17 and 19); they composed 55.9% of the first- and second-year students and 62.6% of the village residents. We found no differences among different major study groups regarding the economic situations of their families (chi square = 4.271, P = 0.371) and being satisfied with their education (chi square = 2.514, P = 0.642). No relationship was found for anxiety scores. Comparing student from rural backgrounds to those from towns or cities, it was found that the former had much higher rates of heightened stress, anxiety, and depression. More related to determine frequency of stress, anxiety and depression (17) all students scored >19 on AKUADS across all programs offered at AKU, which shows a higher stress/anxiety rate as compared to depression yet the MBBS SSI scores (p=0.188) Gender wise Distribution Stressor (0.612) Significant difference was observed between girls and boys in facing situations and responding to stressors females had greater stress levels than males did. However, a study conducted in 2021 stated that the examined three different approaches to stress relaxation (12) significant changes in higher on follow-up assessment relaxation scores compared to the control group. None of the relaxation groups differed from one another on follow-up assessment relaxation scores (ps > 0.621).Number of studies highlights the evidence of effectiveness of music therapy with relaxation technique on stress management conducted by

Francisca N. Ogba, PhDa ,et.al (11) reported a significant that there were no baseline differences in stress management level between participants in the treatment and waitlist control conditions (P=.418) However, the discrepancy of results may possibly occur due to prolonged training that may reduce stress among health science student. Hence our study concluded that Progressive Muscle Relaxation and deep breathing exercises to overcome stress as well as improve the mental and physical well-being of students going through it.

Conclusion:

The results of the present study found that most of the students' experienced stress was categorized as low, moderate, severe levels. The study suggests that effect of 4-week practice of Progressive muscle relaxation technique with deep breathing is found to be effective in reducing perceived stress among Health science students. When progressive muscle relaxation is practiced and incorporated into student's daily routine, it would definitely help them to alleviate academic stress and better cope up with the daily hassles of academic life. Programs at college need to address stress management and support needs of students which can reduce the perceived stress and improve academic performance. Long-term use of this technique helps students manage their stress better, which makes it easier for them to handle academic stress and improve their performance. Further studies are needed in this regard.

Limitation of the study:

It is essential to recognize that the outcomes may be influenced by various external factors, including individual coping mechanisms, pre-existing mental health conditions, and external support systems. The study assumes consistent adherence to prescribed relaxation techniques by participants. Variations in individual compliance, motivation, or engagement with the interventions could influence the observed outcomes and should be considered as a potential limitation.

Future recommendations:

Future research should consider conducting longitudinal studies to track the sustained impact of relaxation techniques among Health Sciences students, providing insights into the durability of stress reduction effects. Tailoring interventions based on individual preferences, incorporating technological solutions for accessibility, and evaluating institutional policies to create a conducive environment for stress reduction are crucial areas for further investigation. These recommendations aim to inform future research and interventions, promoting a comprehensive understanding of effective strategies for alleviating academic-induced stress in Health Sciences students.

REFERENCES

Referencing

1. El Salamony AA, Zewiel MA, Elsayes HA. Enhancing Self-Control among University Students Risky for Suicide through Adaptation Strategies. Tanta Scientific Nursing Journal. 2023 Feb 1; 28(1):149-68.
2. PALKAR D, PANIGRAHI S, SHATADAL P, MEHTA R. Impact of Jacobson's Progressive Muscle Relaxation on Stress Levels of Exam Going MBBS Students of a Medical College in South Gujarat, India. Journal of Clinical & Diagnostic Research. 2021 Aug 1; 15 (8).
3. Kafeel T, Shoaib R, Sohail F, Yamin F, Ahmed I, Paracha H. Level of Stress among Doctor of Physical Therapy Students in Karachi, Pakistan. Indian Journal of Physiotherapy & Occupational Therapy. 2018 Jan 1; 12(1).
4. Gangadharan MP, Madani MA. Effectiveness of progressive muscle relaxation techniques on depression, anxiety and stress among undergraduate nursing students. Int J Health Sci Res. 2018; 8(2):155-63.
5. Perciavalle V, Blandini M, Fecarotta P, Buscemi A, Di Corrado D, Bertolo L, Fichera F, Coco M. The role of deep breathing on stress. Neurological Sciences. 2017 Mar; 38(3):451-8.

6. Toussaint L, Nguyen QA, Roettger C, Dixon K, Offenbächer M, Kohls N, Hirsch J, Sirois F. Effectiveness of progressive muscle relaxation, deep breathing, and guided imagery in promoting psychological and physiological states of relaxation. Evidence-Based Complementary and Alternative Medicine. 2021 Oct; 2021.
7. Hamdani SU, Zafar SW, Waqas A, Rahman A. Effectiveness of relaxation techniques to reduce distress, anxiety and depression in adolescents: An insight analysis report based on systematic review, meta-analysis and qualitative narrative review of literature.
8. Logan S. Perceived Stress and Coping Strategies in Entry-Level Doctor of Physical Therapy Students Enrolled in a Hybrid-Learning Curriculum during the Pandemic. Open Journal of Medical Psychology. 2022 Mar 31; 11(2):57-71.
9. Ashraf NA, Sahar S. PREVALENCE OF STRESS AMONG PHYSICAL THERAPY STUDENTS: A COMPARATIVE STUDY BETWEEN PUBLIC AND PRIVATE UNIVERSITIES. Pakistan Journal of Rehabilitation. 2021 Jul 6; 10(2).
10. Robotham D, Julian C. Stress and the higher education student: a critical review of the literature. Journal of further and higher education. 2006 May 1;30(02):107-17.
11. Ogba FN, Ede MO, Onyishi CN, Agu PU, Ikechukwu-Ilomuanya AB, Igbo JN, Egenti N, Manafa I, Amoke C, Nwosu NC, Omeke FC. Effectiveness of music therapy with relaxation technique on stress management as measured by perceived stress scale. Medicine. 2019 Apr;98(15).
12. Toussaint L, Nguyen QA, Roettger C, Dixon K, Offenbächer M, Kohls N, Hirsch J, Sirois F. Effectiveness of progressive muscle relaxation, deep breathing, and guided imagery in promoting psychological and physiological states of relaxation. Evidence-Based Complementary and Alternative Medicine. 2021 Oct;2021.
13. Pawlow LA, Jones GE. The impact of abbreviated progressive muscle relaxation on salivary cortisol. Biological psychology. 2002 Jul 1;60(1):1-6.
14. Sivoňová M, Žitňanová I, Hlinčíková L, Škodáček I, Trebatická J, Ďuračková Z. Oxidative stress in university students during examinations. Stress. 2004 Sep 1;7(3):183-8.
15. Chaudhuri A, Ray M, Saldanha D, Bandopadhyay AK. Effect of progressive muscle relaxation in female health care professionals. Annals of Medical and Health sciences research. 2014;4(5):791-5.
16. Bayram N, Bilgel N. The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. Social psychiatry and psychiatric epidemiology. 2008 Aug;43:667-72.
17. Rehmani N, Khan QA, Fatima SS. Stress, Anxiety and Depression in students of a private medical school in Karachi, Pakistan. Pakistan journal of medical sciences. 2018 May;34(3):696.
18. Bhat RM, Sameer MK, Ganaraja B. Eustress in education: analysis of the perceived stress score (PSS) and blood pressure (BP) during examinations in medical students. Journal of Clinical and Diagnostic Research. 2011;5(7):331-1335.
19. Waqas A, Zubair M, Zia S, Meraj H, Aedma KK, Majeed MH, Naveed S. Psychosocial predictors of antenatal stress in Pakistan: perspectives from a developing country. BMC Research Notes. 2020 Dec;13:1-6.
20. Gustainienė L, Perminas A, Pečiulienė I, Jarašiūnaitė G. Effectiveness of progressive muscle relaxation and biofeedback–assisted relaxation in reducing perceived stress among students with regard to personality features. International journal of psychology: a biopsychosocial approach. 2015(16):67-91.
21. Waqas A, Khan S, Sharif W, Khalid U, Ali A. Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: a cross sectional survey. PeerJ. 2015 Mar 12;3:e840.
22. Husain N, Creed F, Tomenson B. Depression and social stress in Pakistan. Psychological medicine. 2000 Mar;30(2):395-402.
23. Rizvi F, Qureshi A, Rajput AM, Afzal M. Prevalence of depression, anxiety and stress (by DASS scoring system) among medical students in Islamabad, Pakistan. Br J Med Med Res. 2015;8(1):69-75.

24. Babur MN, Liaqat M. Prevalence and factors effecting depression, stress and anxiety among physiotherapists of Pakistan. Isra Med J. 2017 Nov 1;9(6):427-30.
25. Noor R, Bashir MS, Nayab S. Sources of stress among Doctor of Physical Therapy Students: JRCRS. 2016; 4 (2): 81-85. Journal Riphah College of Rehabilitation Sciences. 2016 Nov 1;4(2):81-5.
26. Shah I, Habib SH, Yousafzai YM, Ali A, Ikram S, Zia H, Said R. PERCEIVED STRESS IN UNDERGRADUATE PHYSICAL THERAPY STUDENTS OF PESHAWAR, PAKISTAN. Pakistan Journal of Physiology. 2018 Sep 30;14(3):60-3.
27. Shah I, Habib SH, Yousafzai YM, Ali A, Ikram S, Zia H, Said R. PERCEIVED STRESS IN UNDERGRADUATE PHYSICAL THERAPY STUDENTS OF PESHAWAR, PAKISTAN. Pakistan Journal of Physiology. 2018 Sep 30;14(3):60-3.