

ASSOCIATION OF DEPRESSION, ANXIETY AND STRESS IN MEDICAL STUDENTS STUDYING IN MODULAR, SEMESTER AND ANNUAL EXAMINATION SYSTEM

Abstract:

Background: When there are high demands besides less resources, a person experiences a feeling of fear that is known as "Stress". Students of professional schools/colleges and universities are encounter more stress than the general population as they are in a transitory phase from adolescence to adulthood. It has been highlighted that medical education has greater association with stress. There are three examination systems that are been followed by medical colleges of Pakistan (modular, semester and annual systems). However, to the best of our knowledge, no data is available to show the association of stress with current examination systems in our country.

Aims: The objectives of our study were to find out the association of stress with different examination systems and to identify the frequency of stress causing and coping factors adopted by 1st, 2nd and 3rd year medical students studying in colleges having different examination systems i.e. modular, semester and annual.

Study design: Comparative cross-sectional study

Place & duration of study: This study was conducted from December 2018 to April 2019 in three medical colleges of Sindh having above mentioned examination systems.

Study population: Medical students of 1st 2nd and 3rd year.

METHODOLOGY: To assess depression, anxiety and stress among study population, DASS scale was used. To identify the stress causing and coping factors in the students Likert scale based proforma with 19 factors were given to the selected participants

Results: There was no significant association of examination system with depression, anxiety and stress, however various stress causing and coping factors were found significant in altering medical student's life.

CONCLUSION: According to our study, the frequency of stress in the medial students has no association with the examination systems (modular, semester and annual), currently followed by the medical colleges in Sindh.

Key words: stress, stress causing factors, coping factors, medical education, different examination systems,

Introduction:

When demands exceed the available resources, a person experience a feeling of fear known as "Stress"⁽¹⁾. Stress can act as a motivator and is indispensable for survival. Nevertheless, if this phenomenon is triggered readily or concurrently associated with multiple stressors, it can challenge a person's mental and physical health. Students in professional schools/colleges and universities are supposed to encounter stress, more than the general population as they are in a transitory phase from adolescence to adulthood^{(2) (3)}. Stress is classified into three main areas: 1. Academic pressures 2. Social issues and 3. Financial problems⁽⁴⁾. Stressful condition can affect academic performance, social life and may lead to dementia⁽⁵⁾, hypertension, aging, obesity⁽⁶⁾, impaired immune system, suppressed fertility and various digestive problems^{(7) (8)}. Furthermore, stress has been also linked to substances use and drug addiction⁽⁹⁾.

54 It has been highlighted that medical education has greater association with stress ⁽¹⁰⁾ ⁽¹¹⁾. In a meta-
 55 analysis, prevalence of stress was found to be variable among medical schools and colleges of different
 56 regions; shown to be 20.9% among students of a Nepali medical school, 63.8% in students of Saudi
 57 Arabian medical college and 90% in a Pakistani medical college. Other relevant researches have
 58 revealed that stress may lead to increase tendency for suicide as was documented that 2.7% of medical
 59 students in Sweden made suicidal attempts on the account of stress. ⁽¹²⁾. Studies have reported that
 60 factors causing stress in medical students are attendance system, curriculum, college environment, and
 61 the examination process ⁽¹³⁾ ⁽¹⁴⁾.

62
 63 Qamar et.al elaborated that among all factors the conduction of exams was significantly associated with
 64 stress in students of a medical college in Islamabad ⁽¹⁵⁾. In Pakistan, generally three examination systems
 65 are being followed by medical colleges including modular, semester and annual systems. However, to the
 66 best of our knowledge, no data is available to show the association of stress with current examination
 67 systems in our country. Hence the current study was undertaken to find out the association of stress with
 68 different examination systems and to identify the stress causing and coping factors used by medical
 69 students of 1st, 2nd and 3rd year studying in medical colleges having modular, semester and annual
 70 examination systems in the province of Sindh Pakistan.

71 **METHODOLOGY:**

72 Three medical colleges in the province of Sindh having different examination systems i.e. modular,
 73 semester and annual were selected. Students of 1st, 2nd, and 3rd year MBBS were targeted population. It
 74 was a comparative cross-sectional study conducted from December 2018 to April 2019. Sample size (n)
 75 was calculated using 50 percent proportion of selected population, the total calculated sample size was
 76 390 but “n” was kept at 450 to overcome the attrition. Participants were recruited using multi stage
 77 sampling technique. Significance level was kept at 95%. To assess depression, anxiety and stress among
 78 study population, **DASS** was used. To identify the stress causing and coping factors in the students
 79 **Likert scale** based proforma with 19 factors were given to the selected participants. In the given
 80 proforma students were asked how frequently (never, sometimes or most of the times) the particular
 81 factor is responsible as stress causing or coping agent Prior to the handing over of proforma students
 82 were briefed about the purpose of study and their consents were also taken verbally and finally were
 83 asked to fill the proforma.

84
 85 **Data analysis:**

86 Data was analyzed using SPSS version 20.
 87 Chi square test was applied to analyze the association of depression, anxiety and stress among students
 88 with their examination systems as well as their academic year i.e 1st, 2nd and 3rd year.
 89 The same test was applied again to associate the frequency of stress causing and coping factors in
 90 students studying in different universities and also with their academic year i.e 1st, 2nd and 3rd year.
 91 P-value less than 0.05 was considered as significant.

92
 93 **Results:**

94 Depression, anxiety and stress were not significantly associated with examination systems as well as
 95 academic year of MBBS students as shown in table 1 and 2.

96
 97
 98
 99
 100
 101 **Table 1. Association of depression, anxiety and stress in students of different examination**
 102 **system,N=**

	Modular system n%					Semester system					Annual system					P value
Dass criteria*	N	M	Mo	S	ES	N	M	MO	S	ES	N	M	MO	S	ES	
Depressio n	3.6	2.1	12.9	13.6	67.9	3.8	1.9	10.5	13.3	70.5	3.3	1.6	9.8	9.8	75.4	0.975

Anxiety	1.2	1.2	1.2	2.4	94	2.4	3.3	9.1	4.3	80.9	1.4	0.0	4.1	8.1	86.5	0.064
Stress	7.9	11.8	22.0	23.1	26.3	81.6	52.9	56.1	53.8	53.9	10.5	35.3	22.0	23.1	19.8	0.074

103 (* N= normal, M = mild, Mo = moderate, S = severe and ES = extremely severe)

104
105
106
107
108
109

Table 2. Association of depression, anxiety and stress in 1st, 2nd and 3rd MBBS students

Dass criteria*	1 st year					2 nd year					3 rd year					P value
	N	M	Mo	S	ES	N	M	MO	S	ES	N	M	MO	S	ES	
Depression	38.5	42.9	43.9	42.2	36.4	30.8	28.6	26.8	31.1	28.4	30.8	28.6	29.3	26.7	35.2	0.275
Anxiety	57.1	25.0	43.5	47.1	37.2	28.6	25.0	26.1	29.4	28.8	14.3	50.5	30.4	23.5	34.0	0.879
Stress	42.1	47.1	41.5	48.7	34.5	26.3	29.4	31.7	30.8	28.0	31.6	23.5	26.8	20.5	37.5	0.528

110 (* N= normal, M = mild, Mo = moderate, S = severe and ES = extremely severe)

111
112 However out of nineteen stress causing factors, homesickness, college environment, examination
113 system, corruption in the environment and lack of health facilities were significantly associated with the
114 prevalence of stress among medical students as shown in Table 3.
115 While among all coping factors adopted by medical students, well defined curriculum, feedback and
116 motivational sessions, counseling and emotional support from family, walking, use of gym, shopping and
117 use of social media (Facebook, WhatsApp, twitter) were found to be significant as displayed in table 4.

118
119
120
121
122
123
124
125
126
127
128
129
130
131

Table.3 Association of stress causing factors in medical students

Factors that causes Stress	Modular system			Semester system			Annual system			p-value
	Never	Some times	Most of the times	Never	Some times	Most of the times	Never	Some Times	Most of the times	
Homesickness	60.5%	27.9%	11.6%	26.7%	43.3%	36.0%	35.1%	44.6%	20.3%	0.000*

Pressure of studies	12.8%	29.1%	58.1%	10.6%	38.6%	50.0%	1.4%	35.1%	63.0%	0.053
Time table / study schedule	23.3%	30.2%	46.5%	29.0%	36.2%	33.3%	23.6%	41.9%	35.1%	0.438
Bullying / raging	75.6%	19.8%	4.7%	64.3%	24.8%	10.5%	59.5%	24.3%	16.2%	0.210
Language problem	67.4%	30.2%	2.2%	61.0%	30.5%	8.1%	52.7%	33.8%	13.5%	0.185
Physical health / weight issue	43.5%	32.9%	23.5%	38.9%	39.4%	21.6%	43.2%	35.1%	21.6%	0.858
College environment	46.5%	41.9%	11.6%	39.0%	42.4%	18.1%	47.3%	24.3%	28.4%	0.042*
Ethical conflicts	59.3%	24.4%	16.3%	55.2%	37.1%	7.6%	48.6%	40.5%	10.8%	0.061
Personal life events	29.1%	44.2%	26.7%	34.8%	47.1%	18.1%	32.4%	47.3%	20.3%	0.564
Waking time in the morning	47.7%	17.4%	34.9%	52.9%	26.2%	21.6%	60.8%	17.6%	21.6%	0.050
Event of Examination	22.1%	41.9%	36.0%	26.2%	43.3%	30.0%	16.2%	29.7%	54.0%	0.025*
Surprise test / continuous assessment	34.1%	36.5%	29.4%	31.9%	38.1%	30.0%	21.6%	35.1%	43.2%	0.211
Lack of extra-curricular activity	34.9%	33.7%	31.4%	34.3%	37.1%	28.6%	28.4%	41.9%	29.2%	0.818
High parental expectations	36.6%	37.2%	26.7%	30.5%	40.5%	29.0%	32.4%	32.4%	35.1%	0.634
Security / law and order	45.3%	32.6%	22.1%	40.5%	37.6%	21.9%	59.5%	27.0%	13.5%	0.081
Corruption in the environment	36.0%	38.4%	25.6%	22.0%	35.4%	42.6%	28.4%	24.3%	47.3%	0.011*
Lack of health facilities	37.2%	39.5%	23.3%	21.0%	41.9%	37.1%	23.0%	39.2%	37.8%	0.032*
Academic grading system	22.6%	42.9%	34.5%	21.5%	49.3%	29.2%	28.4%	40.5%	29.2%	0.588
Attendance system	18.6%	30.2%	51.2%	24.3%	26.7%	49.0%	13.5%	30.1%	51.4%	0.310

133 P-value < 0.05 is marked as *

134

135

136 **Table 4. Association of coping factors adopted by students**

Coping factors that helps to reduce stress	Modular system			Semester system			Annual system			p-value
	Never	Some Times	Most of the times	Never	Some times	Most of the times	Never	Some times	Most of the times	

Good educational environment	22.1%	36%	40.7%	14.3%	32.9%	52.9%	17.6%	33.8%	48.6%	0.276
Well defined curriculum	19.8%	41.9%	38.4%	9%	48.6%	42.4%	21%	29%	48.6%	0.006*
Feedback & motivational session	26.7%	44.2%	29.1%	23.8%	30.0%	46.2%	16.4%	24.7%	58.9%	0.004*
Scholarships	42.4%	18.8%	38.8%	32.4%	30.0%	37.6%	32.4%	20.3%	47.3%	0.129
Extracurricular activities	17.4%	33.7%	48.8%	19.0%	45.2%	35.7%	16.2%	35.1%	48.6%	0.155
Self-efficacy	19.8%	27.9%	52.8%	15.2%	35.7%	49.0%	16.5%	34.6%	48.9%	0.576
Counseling/emotional support from family	17.4%	29.1%	53.5%	7.1%	29.6%	63.8%	16.2%	12.2%	71.6%	0.003*
Meditation / prayers	17.4%	18.6%	64.0%	9.0%	21.4%	69.5%	13.5%	16.2%	70.3%	0.290
Relaxed class room environment	22.1%	40.7%	37.2%	25.2%	37.6%	37.1%	29.7%	28.4%	41.9%	0.543
Alcohol / smoking / drug use	77.9%	12.8%	9.3%	85.2%	6.7%	8.1%	90.5%	2.7%	6.8%	0.141
Going out with friends	15.1%	37.2%	47.7%	14.8%	40.0%	45.2%	21.6%	43.2%	35.1%	0.449
Watching TV / Movie	15.1%	38.4%	46.5%	15.7%	42.4%	41.9%	23.0%	31.2%	31.8%	0.566
Reading books	29.1%	34.9%	36.0%	19.5%	43.3%	37.1%	24.3%	41.9%	33.8%	0.433
Taking a walk	11.6%	34.9%	53.5%	13.3%	48.1%	38.6%	23.0%	39.2%	37.8%	0.031*
Going to gym	29.4%	24.7%	45.9%	37.1%	35.7%	27.1%	64.9%	17.6%	17.6%	0.000*
Going to shopping	34.95	29.1%	36.0%	22.4%	44.3%	33.3%	29.7%	28.4%	49.9%	0.028*
Eating out	14%	27.9%	58.1%	15.2%	41.4%	43.3%	21.6%	37.8%	40.5%	0.083
Cocking	44.2%	24.4%	31.45	43.8%	35.2%	21.0%	55.4%	27.0%	17.6%	0.075
Use of social media like Facebook / whatsapp / twitter	27.9%	40.7%	31.4%	11.0%	32.9%	56.2%	18.9%	37.8%	43.2%	0.000*

137 P-value < 0.05 is marked as *

138

139

140 Discussion:

141 Surveys conducted in the United States have displayed fairly high frequencies of depression and poor
142 mental health amongst medical students due to stress, unsatisfactory coping strategies and inappropriate
143 counselling ⁽¹⁶⁾ ⁽¹⁷⁾ ⁽¹⁵⁾. In our study, though the frequency of stress among MBBS students was not
144 significantly associated with different examination systems as well as with their academic years (1st, 2nd
145 and 3rd year). Nevertheless, when event of examination was considered as a variable, it was found to be
146 one of the significant stress causing factors with a p-value (0.025), This finding of our study was similar to

147 one of the study conducted on the students of medical college in Islamabad ⁽¹⁵⁾ and was also in
148 accordance to other studies conducted across the globe including USA ⁽¹⁶⁾. Homesickness was highly
149 associated as a stress causing factor in the target population of our study, also highlighted by Rab et.al;
150 he documented medical students residing in hostels were more prone to stress in comparison to the
151 students living in their homes ⁽¹⁸⁾. While considering the stress relieving factors, feedback and
152 motivational sessions, counseling and emotional support from family is thought to be one of the best
153 strategy to cope up with the stress as suggested by some studies ⁽¹⁹⁾. This is in accordance to our study
154 displaying that well defined curriculum, feedback and motivational sessions, counseling and emotional
155 support from family are stress relieving factors for medical students. Furthermore, according to a study
156 conducted in Saudi Arabia, the students overcome the stress by using different coping factors such as
157 hang out with friends, use of social media, playing games and going to gym etc. ⁽²⁰⁾. Our study population
158 also signified that walking, shopping, going to gym and use of social media on internet help them to cope
159 up with the stress.
160 Since 1988 in United States and Canada, health promoting programs have been running in medical
161 schools to facilitate the students about coping strategies against stress to reduce its negative effects on
162 their physical and mental health with subsequent effects on academic results ^{(21) (22)}. Currently various
163 stress management programs are available for medical students across the globe to enable them to cope
164 up the stress ⁽²³⁾.

165

166 **CONCLUSION AND RECOMMENDATIONS:**

167 According to our study, the frequency of stress in the medial students has no association with the
168 examination systems (modular, semester and annual), currently followed by the medical colleges in
169 Sindh. Whereas, event of examination is one of the significant stress causing factor which can be
170 managed by well-defined curriculum, positive feedbacks, family support and counseling sessions.
171 It is evident that stress is one of the major predictor of poor academic performances in medical students
172 that may affect their general, physical and mental health. Therefore, we strongly suggest that stress
173 management peer based counseling programs should be initiated at national level and should be
174 regularly conducted as a part of MBBS curriculum in the initial academic years of medical colleges in
175 Pakistan. This will help the students to be self-reliant to alleviate the stress, enhance their mental as well
176 as physical health and ensure their good academic performances, with subsequent provision of better
177 future doctors for our country.

178

179

180 **References:**

- 181 1. Heinen I, Bullinger M, Kocalevent R-DJBme. Perceived stress in first year medical students-
182 associations with personal resources and emotional distress. BMC medical education
183 2017;17(1):4.
- 184 2. Abdulghani HM, AlKanhah AA, Mahmoud ES, Ponnampereuma GG, Alfari EAJJoh, population,,
185 nutrition. Stress and its effects on medical students: a cross-sectional study at a college of medicine in
186 Saudi Arabia. Journal of health, population,. 2011;29(5):516.
- 187 3. Sarokhani D, Delpisheh A, Veisani Y, Sarokhani MT, Manesh RE, Sayehmiri KJDr, et al. Prevalence
188 of depression among university students: a systematic review and meta-analysis study. J Depression
189 research
190 treatment
191 2013;2013.
- 192 4. Youssef FFJAP. Medical student stress, burnout and depression in Trinidad and Tobago. J
193 Academic Psychiatry
194 2016;40(1):69-75.
- 195 5. Negrón-Oyarzo I, Aboitiz F, Fuentealba PJNp. Impaired functional connectivity in the prefrontal
196 cortex: a mechanism for chronic stress-induced neuropsychiatric disorders. J Neural plasticity
197 2016;2016.
- 198 6. Scott SB, Graham-Engeland JE, Engeland CG, Smyth JM, Almeida DM, Katz MJ, et al. The effects
199 of stress on cognitive aging, physiology and emotion (ESCAPE) project. J BMC psychiatry
200 2015;15(1):146.

- 201 7. Stewart SM, Betson C, Marshall I, Wong C, Lee P, Lam TJMe. Stress and vulnerability in medical
202 students. *J Medical education*. 1995;29(2):119-27.
- 203 8. Graham JE, Christian LM, Kiecolt-Glaser JKJJobm. Stress, age, and immune function: toward a
204 lifespan approach. *J Journal of behavioral medicine*
205 2006;29(4):389-400.
- 206 9. Melaku L, Mossie A, Negash AJJoBE. Stress among medical students and its association with
207 substance use and academic performance. *J Journal of Biomedical Education*
208 2015;2015.
- 209 10. Dahlin M, Joneborg N, Runeson BJMe. Stress and depression among medical students: A
210 cross-sectional study. *J Medical education*
211 2005;39(6):594-604.
- 212 11. Beiter R, Nash R, McCrady M, Rhoades D, Linscomb M, Clarahan M, et al. The prevalence and
213 correlates of depression, anxiety, and stress in a sample of college students. *J Journal of affective*
214 *disorders*
215 2015;173:90-6.
- 216 12. Abebe AM, Kebede YG, Mengistu FJPj. Prevalence of Stress and Associated Factors among
217 Regular Students at Debre Birhan Governmental and Nongovernmental Health Science Colleges North
218 Showa Zone, Amhara Region, Ethiopia 2016. *Psychiatry journal*. 2018;2018.
- 219 13. van Zyl PM, Joubert G, Bowen E, du Plooy F, Francis C, Jadhunandan S, et al. Depression, anxiety,
220 stress and substance use in medical students in a 5-year curriculum. *J African Journal of Health*
221 *Professions Education*. 2017;9(2):67-72.
- 222 14. Wahed WYA, Hassan SKJAJoM. Prevalence and associated factors of stress, anxiety and
223 depression among medical Fayoum University students. *J Alexandria Journal of Medicine*. 2017;53(1):77-
224 84.
- 225 15. Qamar K, Khan NS, Bashir Kiani MJJPMA. Factors associated with stress among medical students.
226 *J Pak Med Assoc*. 2015;65(7):753-5.
- 227 16. Dyrbye LN, Thomas MR, Eacker A, Harper W, Massie FS, Power DV, et al. Race, ethnicity, and
228 medical student well-being in the United States. *J Archives of Internal Medicine*. 2007;167(19):2103-9.
- 229 17. Thomas MR, Dyrbye LN, Huntington JL, Lawson KL, Novotny PJ, Sloan JA, et al. How do distress
230 and well-being relate to medical student empathy? A multicenter study. *J Journal of general internal*
231 *medicine*
232 2007;22(2):177-83.
- 233 18. Rab F, Mamdou R, Nasir SJEMhj. Rates of depression and anxiety among female medical
234 students in Pakistan/Taux de depression et d'anxiete chez les etudiantes en medecine au Pakistan. *J*
235 *Eastern Mediterranean health journal*. 2008;14(1):126-34.
- 236 19. Drageset JJSJoCS. The importance of activities of daily living and social contact for loneliness: a
237 survey among residents in nursing homes. *Scandinavian Journal of Caring Sciences*
238 2004;18(1):65-71.
- 239 20. Shaikh BT, Kahloon A, Kazmi M, Khalid H, Nawaz K, Khan N, et al. Students, stress and coping
240 strategies: a case of Pakistani medical school. *J EDUCATION FOR HEALTH-ABINGDON-CARFAX*
241 *PUBLISHING LIMITED-*. 2004;17:346-53.
- 242 21. Wolf TM, Faucett JM, Randall HM, Balson PMJJoME. Graduating medical students' ratings of
243 stresses, pleasures, and coping strategies. *Journal of Medical Education*
244 1988.
- 245 22. Wolf TM, Randall HM, Faucett JMJAJoHP. A survey of health promotion programs in US and
246 Canadian medical schools. *J American Journal of Health Promotion*. 1988;3(1):33-6.
- 247 23. Shiralkar MT, Harris TB, Eddins-Folensbee FF, Coverdale JHJAP. A systematic review of stress-
248 management programs for medical students. *J Academic Psychiatry*. 2013;37(3):158-64.
- 249