

Original Article

Impact of Lifestyle Modification and Psychological Interventions in Academic Performance of UG Medical Students, Institution Based Prospective, Cross-sectional Study

Lopamudra (Dhar) Chowdhury¹, Prakash Mohite², Ranjan Bhattacharyya³, Anurag Chaudhuri⁴

Introduction : Mental health is considered as an essential component of health by the World Health Organization. Students may not be able to identify their problem and avoid seeking help often due to reasons of confidentiality or finances.

Materials & Methods : In this study, Undergraduate Medical Students of 1st MBBS and 2nd MBBS, who fulfil the inclusion criteria and are willing to participate in the study, were given standardized questionnaire at random and screened for depression, anxiety or stress as per DASS 21 criteria and included in the study after taking proper individualized consent and approval from the Institutional Ethics Committee. Their academic scores in the last two Internal Assessments (IA1 & IA2) before and after Lifestyle Modification (LM) Psychological Interventions (PI) have been noted. The interventions were given via online (four times, each session lasting for 40 minutes) and classroom based (two monthly sessions lasting for one hour) in a small group counselling (n=59) for 2 months. The academic scores were compared before and after the intervention, as well as the DASS 21 score were noted at the end of the study.

Results & Analysis : The academic performance as well as the DASS 21 Score of the study group noted at the beginning and at end of the study were compared and analyzed statistically by Paired T test and was found to be significant. 225 students of both 1st Professional and 2nd Professional MBBS were screened for standardized DASS 21 Score, of which 15 students from 1st Professional MBBS and 44 students from 2nd Professional MBBS were found to have significant depression, anxiety or stress. Paired T-Test of Internal Assessment 1 and 2 (IA1 & IA2) before and after psychological interventions have shown p value 0.001.

[J Indian Med Assoc 2021; 119(12): 45-50]

Key words : Depression, Anxiety, Stress, Medical students, Initial and Final assessment, Psychological interventions.

Medical Education Curriculum spanning five to six years are very strenuous as the Medical Sciences are rapidly expanding with newer therapeutic options and more indepth understanding of the subject. The extensive course and evaluation process in Medical learning takes a heavy toll on Physical and mental health of Medical Students. The previous studies have found that Medical students are more vulnerable to suffer from depression, anxiety and stress^{1,2}.

Many times, otherwise physically and mentally healthy students suffer from depression, anxiety and stress during their days in Medical Colleges³. The stress of UG students gets compounded for their

Editor's Comment :

■ Undergraduate (UG) Medical students are vulnerable to suffer from depression, anxiety and stress. Lifestyle modifications (LM) and Psychological Interventions (PI) have been found to be beneficial in this present study of four months duration. These interventions helped to reduce depression, anxiety and stress among UG Medical students and also found beneficial objectively as evident from improvement in scoring from Internal Assessment at baseline and following LM & PI (IA1 & IA2).

apprehension for future about getting selected in Postgraduate (PG) examination and job opportunities.

The diagnosis of depression is confirmed by classification system of International Classification of Diseases 10th Division (ICD10)/DSM V (Diagnostic and Statistical Manual of Mental Disorders) who shows following symptoms of depressed or low mood, lack of interest in pleasurable activities (anhedonia), low self-esteem, feelings of inappropriate guilt, autonomic arousal, physiological changes, reduced sleep and appetite, poor concentration and suicidal thoughts^{4,5}.

The stress and anxiety symptoms are characterised by constant worry, muscle tension, free floating anxiety and inability to relax^{6,7}. The perception and experience among medical students are also changing rapidly with

¹DA, MD, Professor and Head, Department of Pharmacology, Murshidabad Medical College & Hospital, Berhampore 742101

²MD, PhD, LLB, Vice Dean (Administration), Professor, Forensic Medicine, Datta Megha Institute of Medical sciences, Sawangi, Wardha, Maharashtra 442004

³MD, DNB, Associate Professor & Head, Department of Psychiatry, Murshidabad Medical College & Hospital, Berhampore 742101 and Corresponding author

⁴MBBS, Junior Resident, Datta Megha Institute of Medical sciences, Sawangi, Wardha, Maharashtra 442004

Received on : 05/11/2021

Accepted on : 22/11/2021

rapidly changing social-milieu. The multiple underlying factors play a crucial role like economic debts for carrying expenses, higher tuition fees in private Medical Colleges, living away from home, higher expectations from family, relatives and peer group etc. all of these factors eventually culminate into heightened stress, anxiety and depression among students.

Unfortunately, extensive literature review have found the paucity of research work in this field especially in Indian context. The mental health issues among medical students are often underdiagnosed and if diagnosed are often remain undertreated. These unresolved issues may lead to increase morbidity due to mental health issues and increase mortality due to suicide. This one of the toughest academic career jeopardizes the professional and personal life Worldwide.

The human resource potential are immense in this target group of the study and it has been found in literature that as high as 40% of children in this age group may suffer from depression, anxiety and both.

It is utmost necessary to prevent suicide among Medical Students which is predicted by stress, anxiety, depression and behavioural manifestations⁸. The students acknowledge that both the incidents and severity of their mental health problems are on rise. In the existing literatures have found that depression, anxiety and stresses have significantly increased amongs the medical students but there had not been enough studies especially highlighting the Psychological Interventions among them. The present study aims at Lifestyle Modification (LM) and Psychological Interventions (PI) on Medical students and how beneficial it can be for them.

In various cross sectional as well as in longitudinal studies across 43 nations it has been found that depressive disorders are seen in 27% Medical students which is affecting their scholastic performances leading to social isolation and causing absenteeism⁹.

The college life is full of adventurism where the students learn new skills, becomes smarter, habituated with newer lifestyles, find new friends, roommates and at times life partners and exposed to new cultures and throws newer challenges in life¹⁰.

MATERIALS AND METHODS

The current study is an attempt to find out the personal lifestyle, attitude, mental state amongst the UG Medical Students with a semi-structured questionnaire and to look for the impact of LM & PI in them. In the semi-structured standardized questionnaire various domains like diet, exercises, yoga, meditation, sleep, interpersonal and familial relationships have been explored as well as the impact

of Lifestyle Modification (LM) & PI have been analyzed.

Apart from LM and advising to follow International Sleep Hygiene, the Psychological Interventions like stress management, time management, Brief Psychodynamic Psychotherapy have been given to students jointly by the first author and by the Head of the Department of Psychiatry Department of a tertiary Medical College of Eastern India (Corresponding author).

Dietary factors also play a very crucial role for keeping the students Physically healthy and medically fit. The balanced diet has been defined as eating adequate amount of calories as per the BMI and physical activities. The vegetable sources like those from legumes, restricting saturated fats in particulars and fats in general, reducing intake of granulated Sugar (<10 gm/day), salt (5gm/day), Sodium (2 gm/day) from the available sources¹⁰.

The adequate duration of sleep amounting 6-8 hours/night avoiding daytime snaps, daily exercises which is defined by at least 150–300 minutes of moderate-intensity aerobic exercises with minimum 75–150 minutes of intensive activity or an equivalent combination of the both throughout the week^{11,12}. The regular meditation had been advised among the students which can be defined as meditation for 12 hours and yoga retreat for around 9 hours and self reflective exercises over a week.

The study design consists of institution based, prospective, observational, cross-sectional study comprising of students of 1st and 2nd MBBS students of tertiary Government Medical College in India. The study has been approved by Scientific Review Committee and Institutional Ethics Committee. The 1st and 2nd Professional MBBS students of the College who are having high depression, anxiety or stress in initial assessment by DASS 21 questionnaire have been included in the study (Cut off score in DASS scale Depression subscale >10, Anxiety subscale >8, Stress subscale >15).

Those students who are willing to participate in the study voluntarily and willing to provide written informed consent have been included in the study. The other professional MBBS students of the same Institute, MBBS Students of other Institutes, students who are unwilling to undergo the study and students who are under any medication or therapy have been excluded from the study. The individualized consent of each participating students and approval from the Institutional Ethics Committee has been taken. Their academic scores in the recent semester examination were noted. All students of 1st Professional MBBS and 2nd Professional MBBS were advised to undertake

DASS 21 Questionnaire and from those 225 students, 59 students having higher cut-off score in any of the sub-items have been included in the study. In the questionnaire, their lifestyle history regarding sleep, diet, exercise, meditation, family problem, relationship problem, work stress or addiction have been incorporated.

The inclusion of the subjects was anonymous and voluntary. All participants were included after written informed consent. The students were given printed written information and procedure of consent along with the DASS-21 questionnaire. In addition to DASS-21, information was sought regarding gender; year of study; attendance of a pre-medical University Preparatory Program (UPP); housing and living; addiction history and/or use of any recreational drugs. An additional open-ended section was included to allow students to reflect on the reason/reasons, if any, for their choices in DASS-21. The data from the open-ended section were grouped based on common themes.

Formal in depth interview regarding the lifestyle including diet, exercise, sleep, meditation/ yoga, interpersonal or familial problem if any were noted in structured questionnaire forms. LM & PI were jointly given to the students by the investigator and the HOD of Psychiatry Department of the Institution regularly via Whatsapp group and classroom based small groups at small intervals for four months. The academic scores in initial and final assessments (IA1 & IA2) completion were compared both before and after the intervention, as well as the DASS 21 score were noted at the end of the study. The DASS subitems such as depression, anxiety, and stress can be rated as normal, mild, moderate, and extremely severe and each item is scored in a Likert scale from 0 (didn't apply to me at all) to 3 (much or mostly applied to me) in the past 1 week. The academic performance as well as the DASS 21 score of the study group noted at the beginning and at end of the study were compared and analyzed for any statistical significance¹⁴.

The DASS 21 score and the academic score of students included in the study were compared before and after the intervention were undertaken. Various lifestyle parameters of students, taken into consideration, the depression, anxiety and stress score as per DASS 21 criteria, academic record before and after the intervention were noted down and entered in MS Excel Sheet and assessed by Paired Test for any statistical significance. Validation will be done both by the investigator and senior most faculty of Department of Psychiatry of the same Institute. The DASS 21 score positive students were given interventional lifestyle counselling on regular basis. Their academic score prior

to the intervention as well as at the end of study are to be compared. Their DASS 21 score at the end of study too were assessed for any change.

RESULTS

The study group comprises total 59 Undergraduate students and there are first year (n=15, 24.8 %) and second year students (n= 44, 76.2%) included in the study. The socio demographic variables were compared and their correlation with Depression, Anxiety and Stress subscales (of DASS scale) had been analysed in initial and final evaluation. The initial assessment at baseline before psychological interventions showed that the chi square values are highly significant ($p < 0.001$) across all variables which signifies high levels of baseline depression, anxiety and stress among the first and second year Undergraduates. Among the Students many (n=28 46.1%) complained of having sleep problems and only less than half of them (n=27, 44.7%) have had they are receiving balance nutritious diet in hostel. Only few students (n=11, 18.3 %) were doing regular exercises and all of them who are doing regular exercises are also doing meditation. Among the Students almost half have said (n=29, 49.1%) that they are having current family problems and majority of students (n=32, 52.5%) have acknowledged that they are currently having relationship problems pertaining to relationship break ups, rejection, roommate in adjustability and peer group maladjustment. A significant (n=50, 82.3%) number of students are feeling study related stress and six students (n=6, 10.1%) have acknowledged to have some addiction meeting ICD criteria of substance dependence¹⁵(Table 1).

All those above variables have shown statistically significant at p value 0.001 which suggest the first and second year are having baseline stress with respect to above variables. The final assessment had been done at the end of two months following Psychological Intervention (PI). There are 2 classrooms and 4 online modes of interventions have been done (Table 2). The depression ($p=0.669$), anxiety ($p=0.169$) and stress subscale ($p=0.759$), sleep problems ($p=0.331$), consumption of balance diet ($p= 0.053$), having current family problems ($p=0.252$), current relationship problem ($p=0.061$), study related stress (0.706), addiction problems ($p=0.876$), all these variables were not found statistically significant. However regular exercise ($p=0.031$) and meditation ($p=0.001$), these two variables have been emerged to be statistically significant.

The Paired T -Test of Internal assessment 1 and 2 (IA1 & IA2) before and after Psychological Interventions have shown p value 0.001 which is highly statistically

significant (Table 3). This signifies the successful Psychological Interventions had enabled to reduce level of stress, anxiety and depression among Medical students.

The Crosstab and Pearson's correlation in between various demographic, lifestyles, environmental variables amongst students are shown in Table 4. The depression (IA1) and family Problem are directly correlated (p=0.041); anxiety and meditation are negatively correlated (p=0.038); stress (IA1) and Sleep problems are directly correlated (p=0.028), 'doing regular exercises' variable is negatively correlated with stress (p=0.042), 'having family problems' variable is negatively correlated with stress (IA1) (p=0.001) and 'relationship problem' has been found to be negatively correlated with stress (IA1) (p= 0.001).

Stress in Final assessment (IA2) has been found to be negatively correlated with statistical significance with exercise (p=0.012) and meditation (p=0.030) but directly correlated with family problems (p=0.003). Table 5 shows one sample statistic of Internal Assessment score before (m=10.65±1.703) and after Internal Assessment 2 (Final) (m=12.51±1.612). The IA score has been found to be improved controlling all other confounding variables. In the Table 6, comparing with means with one sample test during initial and final assessment (IA1 & IA2) shows highest significance (p=0.001).

DISCUSSION

Studies have shown that Medical students are more inclined to stress, anxiety and Depression compared to their non-medical peers. Medical students suffer from

Depression and Anxiety Disorders more than their non-medical peer group as medical studies are extremely

Table 1 — Socio-demographic variables and correlation with depression, anxiety and stress subscales in initial intervention

Variable	N (%)	Depression (initial)		Anxiety (initial)		Stress (initial)	
		χ ²	P value	χ ²	P value	χ ²	P value
First year	15 (24.8)	18.520	0.357	13.466	0.409	8.895	0.883
Second year	44 (76.2)						
Sleep problems :							
Yes	28 (46.1)	84.130	0.000**	81.608	0.000**	83.232	0.000**
No	31 (53.9)						
Balanced Diet :							
Yes	27 (44.7)	80.533	0.000**	72.963	0.000**	83.428	0.000**
No	32 (55.3)						
Regular Exercises :							
Yes	11 (18.3)	84.170	0.000**	71.010	0.000**	78.717	0.000**
No	48 (81.7)						
Meditation :							
Yes	11 (18.3)	84.170	0.000**	71.010	0.000**	78.717	0.000**
No	48 (71.8)						
Current family problem :							
Yes	29 (49.5)	78.943	0.000**	76.300	0.000**	86.424	0.000**
No	30 (50.5)						
Current relationship :							
Yes	32 (52.5)	77.533	0.000**	70.359	0.000**	90.550	0.000**
No	27 (47.5)						
Study related stress :							
Yes	50 (82.3)	78.945	0.000**	73.014	0.000**	70.681	0.000**
No	9 (16.7)						
Addiction :							
Yes	6 (10.1)	80.533	0.000**	86.947	0.000**	86.350	0.000**
No	53 (89.9)						

Table 2 — Socio-demographic variables and correlation with depression, anxiety and stress subscales

Variable	N (%)	Depression (initial)		Anxiety (initial)		Stress (initial)	
		χ ²	P value	χ ²	P value	χ ²	P value
First year	15 (24.8)	17.685	0.669	23.587	0.169	17.070	0.759
Second year	44 (76.2)						
Sleep problems :							
Yes	28 (46.1)	27.786	0.146	16.170	0.543	24.310	0.331
No	31 (53.9)						
Balanced Diet :							
Yes	27 (44.7)	19.718	0.539	19.871	0.340	33.685	0.053
No	32 (55.3)						
Regular Exercises :							
Yes	11 (18.3)	17.795	0.662	20.291	0.317	35.925	0.031*
No	48 (81.7)						
Meditation :							
Yes	11 (18.2)	21.531	0.427	15.896	0.600	47.133	0.001**
No	48 (71.8)						
Current family problem :							
Yes	29 (49.5)	23.590	0.313	25.286	0.117	25.991	0.252
No	30 (50.5)						
Current relationship :							
Yes	32 (52.5)	14.346	0.000**	37.858	0.004**	33.081	0.061
No	27 (47.5)						
Study related stress :							
Yes	50 (82.3)	20.967	0.461	16.620	0.549	18.002	0.706
No	9 (16.7)						
Addiction :							
Yes	6 (10.1)	29.809	0.096	16.230	0.576	14.667	0.876
No	53 (89.9)						

demanding and require regular hard work to coping with competition^{16,17}.

Depression, Anxiety and stress if left unrecognized and untreated have high detrimental effect to the individual themselves as well as the society as a whole; with negative outcomes like

medical dropouts, increased suicidal tendency, relationship problems and inability to work effectively. Keeping these in mind, a greater attention is necessary to be given to the psychological well-being of the Medical Students to improve their quality of life and thereby improvement of their academic performance^{18,19}. Symptoms of Depression, Anxiety or Stress may reflect upon their day to day activity, leading to absenteeism, social withdrawal, and lack of interest in studies and

feeling of hopelessness and even suicidal thoughts and attempts^{20,21}. Though there are many studies to establish Depression, Anxiety and Stress among Medical Students, as well as the reasons of such mental state, there are only few interventional study on relieving their depression, anxiety or stress. Demonstration and practice of relaxation exercises, deep breathing exercises, Jacobson's Progressive Muscular Relaxation (JPMR), ways to handle rejection, pitfalls and how to get rid of mobile and social media addiction was also explained in classroom based, large group

counselling sessions by the HOD Department of Psychiatry of the Institute. Students were happy to find someone to confide in about their problems, they could contact the investigator at any moment of need or advice, when they were depressed and could not concentrate in their studies. At the end of study a feedback form was given to all participants. At the end of the study, it was found that there was significant improvement of depression, anxiety as well as stress score among the participants. There was also slight improvement in their academic score in the second internal assessment than the first one.

Table 3 — Paired T-test of Internal Assessment 1 & 2 (CI=95%, 2SD)

Variable	N	Mean	Std Deviation	Std Error of Mean	Significance
Int Assessment 1	59	10.65	1.703	0.222	0.000**
Int Assessment 2	59	12.51	1.612	0.210	

Table 4 — Crosstab and Pearson's correlation in between various Demographic, lifestyle and environmental variables among students

Variables	Sleep	Diet	Exercise	Meditation	Fam Prob	Rel Prob	Study Stress	Addiction
D1								
Pearson correl	-0.137	0.151	-0.050	-0.031	0.267	0.194	0.091	-0.239
Sigf(2 tailed)	0.301	0.255	0.706	0.818	0.041*	0.141	0.494	0.068
A1								
Pearson correl	-0.096	0.059	-0.123	-0.271	0.177	0.040	0.001	-0.248
Sigf(2 tailed)	0.470	0.655	0.352	0.038*	0.180	0.766	0.995	0.058
S1								
Pearson correl	-0.287	0.098	-0.266	-0.345	0.609	0.430	0.055	-0.165
Sigf(2 tailed)	0.028*	0.459	0.042*	0.007**	0.001**	0.001**	0.678	0.212
D2								
Pearson correl	-0.098	0.035	-0.096	-0.023	0.225	0.143	0.173	-0.205
Sigf(2 tailed)	0.459	0.794	0.471	0.860	0.086	0.279	0.190	0.119
A2								
Pearson correl	-0.043	0.164	-0.161	-0.123	0.306	0.250	0.086	-0.196
Sigf(2 tailed)	0.747	0.216	0.224	0.351	0.018*	0.056	0.519	0.138
S2								
Pearson correl	-0.007	0.110	-0.326	-0.283	0.383	0.208	0.028	-0.129
Sigf(2 tailed)	0.959	0.406	0.012*	0.030*	0.003**	0.113	0.835	0.328

Table 5 — One Sample Statistics of Scores of Internal Assessments before and after Psychotherapy

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Internal Assessment 1	59	5	14	10.65	1.703
Internal Assessment 2	59	9	16	12.51	1.612

Table 6 — Comparing means with one sample test during Initial and final assessments and their significance

Variable	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Internal Assessment 1	48.059	58	0.000**	10.653	10.21	11.10
Internal Assessment 2	59.597	58	0.000**	12.508	12.09	12.93

There are certain limitations of the study. The sample size is only modest (n=59) and the study duration is only four months. A longer duration study with a large sample size could have increased the power of the study. However in the present study there had been no dropouts. The results obtained from this study could be more helpful to extrapolate in future. The Internal Assessment Method of Academic Performance undertaken in this study too is not standardized as for complete assessment the overall performance of both formative as well as summative assessments should have been incorporated.

Many studies throughout the world show that medical students suffer from depression, anxiety and stress due to their excessive work pressure, extensive syllabus and various other reasons due the lifestyle they lead. This study proves that though depression, anxiety as well as stress may exist in medical students, these can be overcome by proper identification of its existence, bringing out the causes and providing appropriate LM and PI. The often students often becomes home sick and they can't adjust with their room-mates, peer group, the new environment or work culture they are now exposed to. Hence, they need faculties at their aid, whom they can depend on, confide in, for the solution of their mental anxiety, stress or depression. Such a measure if undertaken in all Medical schools would certainly be helpful in preventing hazardous consequences like suicides and improve the Mental State of many Medical Students improving their quality of life and bringing out better academic performance in the long run.

ACKNOWLEDGEMENTS

Dr Ritu Ghosh, Assistant Professor, Department of Community Medicine, Murshidabad Medical College & Hospital.

Source of funding : Nil.

Conflicts of interest : None.

REFERENCES

- Mao Y, Zhang N, Liu J, Zhu B, He R, Wang X — A systematic review of depression and anxiety in medical students in China. *BMC Med Educ* 2019; **19(1)**: 327. doi: 10.1186/s12909-019-1744-2. PMID: 31477124; PMCID: PMC6
- Liu CH, Stevens C, Wong SHM, Yasui M, Chen JA— The prevalence and predictors of mental health diagnoses and suicide among US college students: Implications for addressing disparities in service use. *Depress Anxiety* 2019; **36(1)**: 8-17. doi: 10.1002/da.22830. Epub 2018 Sep 6. PMID: 30188598; PMCID: PMC6628691.
- Altannir Y, Alnajjar W, Ahmad SO, Altannir M, Yousuf F, Obeidat A, Al-Tannir M — Assessment of burnout in medical undergraduate students in Riyadh, Saudi Arabia. *BMC Med Educ* 2019; **19(1)**: 34. doi: 10.1186/s12909-019-1468-3. PMID: 30683088; PMCID: PMC6347822.
- Park H, Castaño J, Ávila P, Pérez D, Berinsky H, Gambarte L, et al — An Information Retrieval Approach to ICD-10 Classification. *Stud Health Technol Inform* 2019; **264**: 1564-1565. doi: 10.3233/SHTI190536. PMID: 31438233.
- Loas G— Les particularités du DSM-V [The DSM-V : An overview]. *Rev Med Brux*. 2016;**37(4)**:231-234. French. PMID: 28525220.
- Ngasa SN, Sama CB, Dzekem BS, Nforchu KN, Tindong M, Aroke D, et al — Prevalence and factors associated with depression among medical students in Cameroon: a cross-sectional study. *BMC Psychiatry* 2017; **17(1)**: 216. doi: 10.1186/s12888-017-1382-3. PMID: 28599624; PMCID: PMC5466797.
- Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al — Prevalence of Depression, Depressive Symptoms, and Suicidal Ideation Among Medical Students: A Systematic Review and Meta-Analysis. *JAMA* 2016; **316(21)**: 2214-2236. doi: 10.1001/jama.2016.17324. PMID: 27923088; PMCID: PMC5613659
- Dyrbye LN, Thomas MR, Shanafelt TD— Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med* 2006; **81(4)**: 354-73. doi: 10.1097/00001888-200604000-00009. PMID: 16565188.
- Sugumar D, Fleming O, Ogden K — A mental health programme for medical students. *Clin Teach* 2019; **16(4)**: 352-55. doi: 10.1111/tct.13052. Epub 2019 Jul 7. PMID: 31282124.
- Healthy diet — Available from <https://www.who.int/news-room/fact-sheets/detail/healthy-diet> last accessed on January 4th, 2021.
- Chen MY, Wang EK, Jeng YJ— Adequate sleep among adolescents is positively associated with health status and health-related behaviors. *BMC Public Health* 2006; **6**: 59. Published 2006; 8. doi:10.1186/1471-2458-6-59
- Physical Activity — <https://www.who.int/news-room/fact-sheets/detail/physical-activity> last accessed on January 4th, 2021.
- Regular meditation more beneficial than vacation. Available from <https://www.health.harvard.edu/blog/relaxation-benefits-meditation-stronger-HYPERLINK> "https://www.health.harvard.edu/blog/relaxation-benefits-meditation-stronger-relaxation-benefits-taking-vacation-2016102710532"relaxation-benefits-taking-vacation-2016102710532 last accessed on January 4th, 2021.
- Lovibond PF, Lovibond SH — The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther* 1995; **33**: 335-43. [PubMed] [Google Scholar]
- Mental and behavioral disorders due to psychoactive substance use F10-F19. Available from <https://www.icd10data.com/ICD10CM/Codes/F01-F99/F10-F19> last accessed on January 4th, 2021.
- Iqbal S, Gupta S, Venkatarao E— Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. *Indian J Med Res* 2015; **141(3)**: 354-7. doi: 10.4103/0971-5916.156571. PMID: 25963497; PMCID: PMC4442334.
- Kulsoom B, Afsar NA— Stress, anxiety, and depression among medical students in a multiethnic setting. *Neuropsychiatr Dis Treat* 2015; **11**: 1713-22. doi: 10.2147/NDT.S83577. PMID: 26213470; PMCID: PMC4509544.
- Sherina MS, Rampal L, Kaneson N— Psychological stress among undergraduate medical students. *Med J Malaysia* 2004; **59(2)**: 207-11. PMID: 15559171.
- Tran TD, Tran T, Fisher J — Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry* 2013; **13**: 24. doi: 10.1186/1471-244X-13-24. PMID: 23311374; PMCID: PMC3566910.
- Wang X, Hegde S, Son C, Keller B, Smith A, Sasangohar F — Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. *J Med Internet Res* 2020; **22(9)**: e22817. doi: 10.2196/22817. PMID: 32897868; PMCID: PMC7505693.
- Chatterjee SS, Bhattacharyya R, Bhattacharyya S, Gupta S, Das S, Banerjee BB — Attitude, practice, behavior, and mental health impact of COVID-19 on doctors. *Indian J Psychiatry* 2020; **62(3)**: 257-65. doi: 10.4103/psychiatry.IndianJPsychiatry_333_20. Epub 2020 May 15. PMID: 32773868; PMCID: PMC7368446.