IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 6 Ser. 1 (June. 2019), PP 34-40
www.iosrjournals.org

Correlation of Perceived Stress and Socioeconomic Status with Depression and Anxiety Levels in 1st Year Medical Students in Kolkata, West Bengal, India

Dr.Shantanu Tapadar[1], Prof.A.K.Sau[2]
[1](Associate Professor, Department of Physiology, Calcutta National Medical College, Kolkata, India)
[2](Professor & Head, Department of Physiology, Calcutta National Medical College, Kolkata, India)
Corresponding Author: Dr. Shantanu Tapadar

Abstract: *High levels of Stressare causing a burnout in medical students with its associated ill effects on mental health. An enquiry into the correlation of this perceived Stress, with the more serious mental disorders like AnxietyandDepression,was performed in this study on125 first-year MBBS students. Results show a strong positive correlation of Stress with both Anxiety and Depression, with a highly significant statistical value, confirming the role of Stress as a contributory factor to these disorders, even in medical students. Background data collected from the medical students were also evaluated for determining socioeconomic class by employing Kuppuswamy's scale. 55% of the total students suffered from moderate to severe stress: which is found maximum in the students of the Lower Middle class (Class III), who also suffer from the highest levels of Depression. Moderate to severe levels of Anxiety were noted in 32% of students, with maximum prevalence in the highest two socioeconomic classes (Classes I and II). Thus while Anxiety were more prevalent in the Upper socioeconomic classes, Stress and Depression werefound more in the Middle socioeconomic classes.*

Keywords:*GAD-7, Kuppuswamy scale, PHQ-9, PSS-10, Socioeconomic classes*

Date of Submission: 20-05-2019 Date of acceptance: 05-06-2019

I. Introduction

We all live through some of the most stressful situations, but stress is taking its toll on one of the most vulnerable groups in our World today – the Doctors and Medical students: who study, work and strive regularly to live up to the expectations of the millions of human beings. Stress is causing a burnout in medical students [1], and various studies have noted high levels of perceived stress among medical students in India [2,3,4] and the world over [5,6,7].Few studiesmeasuring the more grave mental illness of depression, anxiety and stress levels in adolescent school students in Chandigarh, India[8], and amongst medical students in Karnataka, India [9], have assessed the burden of the disorders in teenagers, but association or any correlation between these disorders inmedical students from India is lacking.

In this Study an attempt has been made to study the mental health of the 1st year medical students, by correlating the amount of perceived stress with the anxiety and depression levels, and applying statistical methods to check how significantly Stress affects these co-morbid conditions.Suicides are being reported every year from medical students studying in different medical colleges of West Bengal, and this study is an attempt to gauge the mental status of these students – whether high levels of co-morbid Depression and Anxiety levels are related to their stress levels. Whether the prevailing socioeconomic status of the students can be blamed for their mental health, is also being investigated in this study.

II. Methodology

A descriptive, observational and institutional based study was carried out amongst the 1st year MBBS students of Calcutta National Medical College, Kolkata, three months after their admission, as per availability, and which formed the study population.In thiscross-sectional study design, total enumeration method was followed for sample collection with prior approval of Institution Ethics Committee. The intention of the study was explained to the students,and those participants who volunteered were asked to provide informed written consent for the study. 125students volunteered and gave consent to participate, but eventually the data collected from one participant was incomplete andwas thus cancelled.

The study tool included a pre-designed, pre-tested Questionnaire Form, incorporated from Perceived Stress Scale-10 (PSS-10) to identify perceived stress, Patient Health Questionnaire (PHQ-9) to identify depression, and Generalised Anxiety Disorder assessment (GAD-7) to screen for Stress, Depression and Anxiety disorders respectively among the study population. Perceived Stress Scale, introduced by Dr.Cohen in 1983

[10], serves for comparisons within a sample, and has been used widely in studies of both mental and physical health and also amongst college students [11]. Each item on the questionnaire is rated on a 5-point scale ranging from never (0) to almost always (4), and positively worded items are reverse scored. Higher scores indicate more perceived stress.

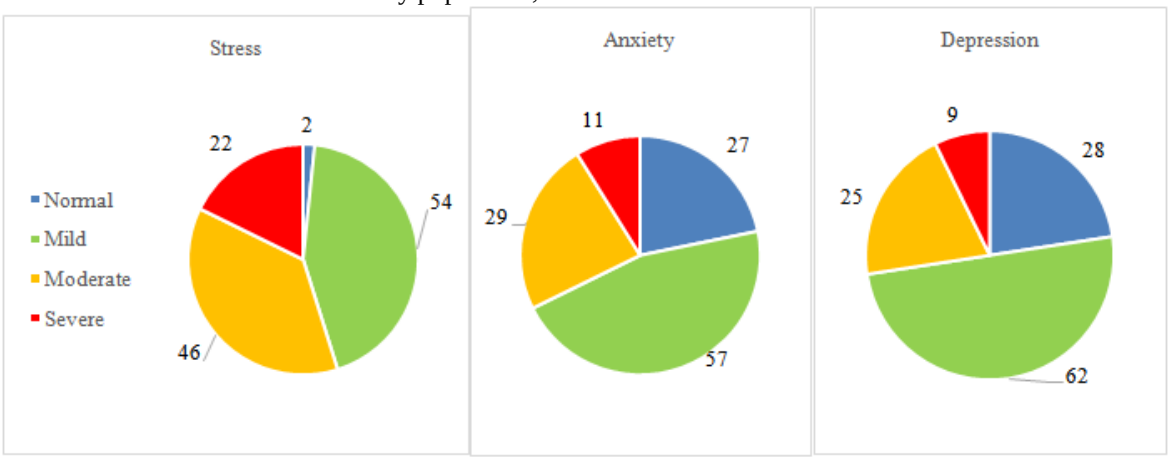
Robert L. Spitzer and his colleagues from New York State Psychiatric Institute and Columbia University developed the **Prim**ary Care **E**valuation of **M**ental **D**isorders (PRIME-MD), in 1990s, but replaced it later with PHQ-9, a self-administered version of the PRIME-MD, and validated it[12]. PHQ-9 is a specific tool to measure depression, byscoring each of the nine DSM-IV criteria based on the mood module from the original PRIME-MD.The GAD-7, subsequently developed by Dr.R.L.Spitzer, as a brief scale for anxiety, scores 7 common anxiety symptoms [13]. The GAD-7 has a sensitivity of 89% and a specificity of 82% for generalised anxiety disorder [14]. Both PHQ-9 and GAD-7 hadbeen adapted and is being used for screening by the Mayo Clinic, Minnesota, USA[15].

The study technique involved self-response to the said questionnaire supplemented with collection of background data in a separate form. In India for urban, rural and semi-urban areas, Kuppuswamy socioeconomic scale is the most frequently used socioeconomic scale [16].Background data involving the occupation and literacy levels of the parents, and family income was collected to compute scores of Kuppuswamy'sSocioeconomic status Scale [16]. Finally every student was placed in each of the I – V Socioeconomic Class of the Kuppuswamy's scale.

The data of this study was compiled in Microsoft Excel 2010and analyzed with appropriate statistical tests. Pearson rank correlation coefficient was applied for correlation between Stress with Depression and Anxiety scores, obtained from the subjects.With a two-tailed hypothesis, a p-value of $p<0.05$ taken as a significantfinding, and $p<0.01$ as highly significant. Regression analysis and the regression line was constructed from socscistatistics.com [17] by finding out the line of best fit from the observed values.

III. Results

A total of 124 students formed the study population, of which 63were male and 61 female students.



	No. of Students with Stress (%)	No. of Students with Anxiety (%)	No. of Students with Depression (%)
Normal	2 (1.6%)	27 (21.8%)	28 (22.5%)
Mild	54 (43.5%)	57 (46%)	62 (50%)
Moderate	46 (37.1%)	29 (23.3%)	25 (20.2%)
Severe	22 (17.7%)	11 (8.9%)	9 (7.3%)

Figure 1: Pie Charts show Stress, Anxiety & Depression in students; with their percentages in the table below.

Fig.1 shows levels of perceived Stress, Anxiety and Depression in total population. A high percentage of moderate to severe degrees of Stress i.e. 54.8%, Anxiety 32.2% and Depression 27.5% are present amongst the 1st year medical students in this study.

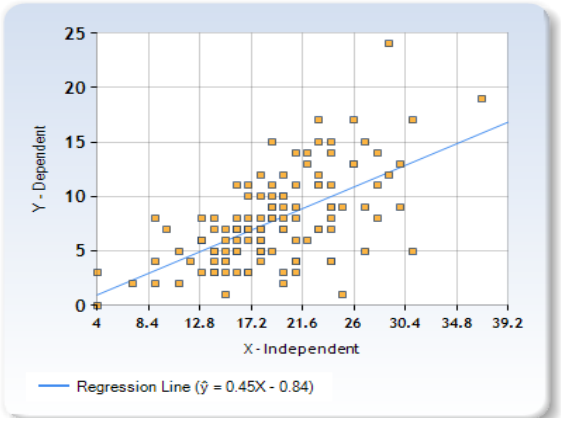


Figure 2: Regression line of Stress with Depression (X-axis= Stress scores, Y-axis=Depression scores)

Perceived Stress and Depression scores computed from the Questionnaire form, answered by the students, is noted down in a tabulated format against each individual. On analysing the paired data of Stress and Depression of the students a regression line of best fit is constructed. In Fig.2, Correlation of Perceived Stress with Depression is shown by constructing this line of best fit as the Regression line. An R value of 0.6132 indicates a moderately strong correlation, and a p-value of $p<0.00001$ was noted which indicates a high level of significance.

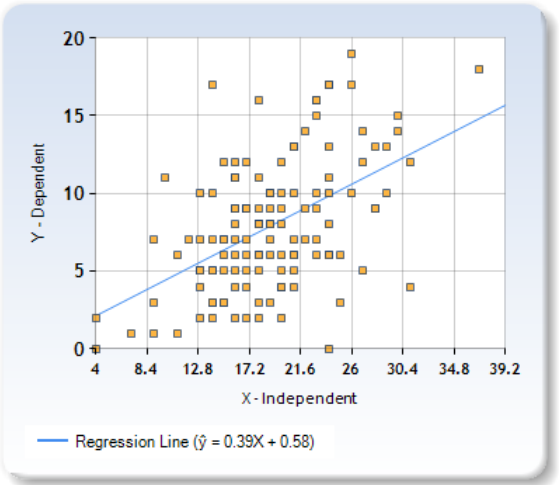


Figure 3: Regression line of Stress with Anxiety(X-axis= Stress scores, Y-axis=Anxiety scores)

A similar method of taking the Anxiety scores from the questionnaire and after matching the paired values of Stress with Anxiety, we get another regression line. In Fig.3, Correlation of Perceived Stress with Anxiety is shown by a Regression line. An R value of 0.5076 indicating a moderately strong correlation, and a p-value of $p<0.00001$ with a high level of significance was noted.

Thus both Depression and Anxiety levels in the medical students show moderately strong correlation with perceived Stress levels in our study.

Next the socioeconomic status of the students were evaluated using Kuppuswamy'ssocioeconomic status Scale [16]. Fig.4 shows the Kuppuswamy Class-wise distribution of the total study population.

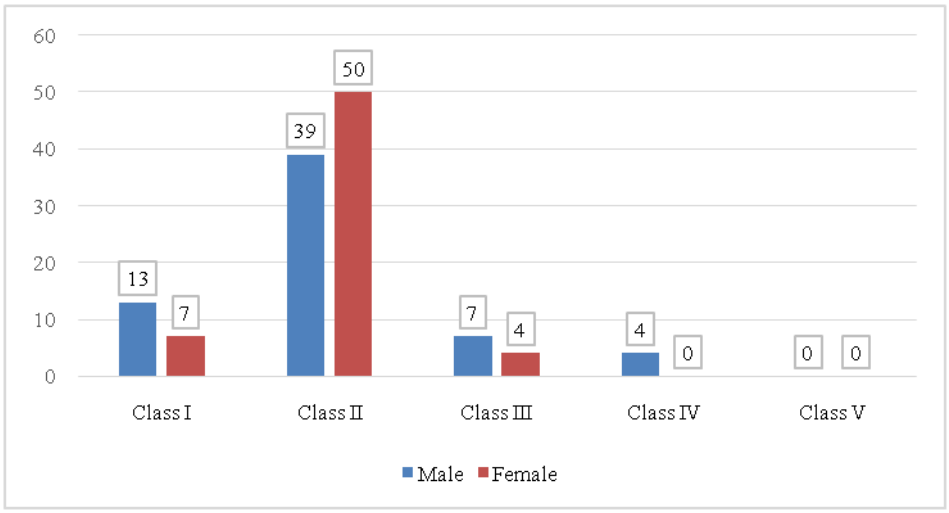


Figure 4: Bar diagram showing distribution of Kuppuswamy's socioeconomic classacross the student population (N=124).

Kuppuswamy socioeconomic scale is a frequently used scale among the researchers, students and public health personals, and its regular updating is done to maintain its validity [16].The scale takes into account the education and occupation of the head of the family. Also the total monthly income of the family is taken to arrive at the Kuppuswamy socioeconomic class. Scores for each of thecategories is added to give a total score, thus equating a higher score with a richer socioeconomic class. Thus Class I or Upper Class is given to a score of 26-29, Class II (Upper Middle) with 16-25, Class III (Lower Middle) with 11-15, Class IV (Upper Lower) with 5-10, and Class V (Lower) with a score of <5.

Fig.4 shows majority of the male and female students belonging to the Upper Middle Class (Class II), followed by Upper Class (Class I), while no student was found to belong to the Lower Class. Additionally no female students were present in the Class IV or Upper Lower class too.

Finally an attempt was made to investigate any possible correlation of the socioeconomic class with Stress, Depression and Anxiety levels. Does belonging to a particular socioeconomic class affect the mental state like Stress, Anxiety & Depression of medical students in any way?Table 1 shows the results in a tabulated form.

Table no. 1 A, B and C: Shows levels of Stress (A), Depression (B) and Anxiety (C) in students belonging to each socioeconomic class I to V.

Table 1A:

Class (Scores)	Stress Normal	Stress Mild	Stress Mod	Stress Severe	Total students
V (<5)	0	0	0	0	0
IV (5-10)	0	2 (50%)	2 (50%)	0	4
III (11-15)	0	3 (27%)	5 (46%)	3 (27%)	11
II (16-25)	2 (2.1%)	40 (45%)	32 (36%)	15 (16.9%)	89
I (26-29)	0	9 (45%)	7 (35%)	4 (20%)	20
Total	2	54	46	22	124

Table 1B:

Class (Scores)	Depression Normal	Depression Mild	Depression Mod	Depression Severe	Total students
V (<5)	0	0	0	0	0
IV (5-10)	1 (25%)	3 (75%)	0	0	4
III (11-15)	0	7 (64%)	4 (36%)	0	11
II (16-25)	22 (24%)	42 (46%)	16 (20%)	9 (10%)	89
I (26-29)	5 (25%)	10 (50%)	5 (20%)	0	20
Total	28	62	25	9	124

Table 1C:

Class (Scores)	Anxiety Normal	Anxiety Mild	Anxiety Mod	Anxiety Severe	Total students
V (<5)	0	0	0	0	0
IV (5-10)	2 (50%)	2 (50%)	0	0	4
III (11-15)	1 (9%)	7 (64%)	2 (18%)	1 (9%)	11
II (16-25)	18 (20.1%)	42 (47.2%)	22 (24.7%)	7 (8%)	89
I (26-29)	6 (30%)	6 (30%)	5 (25%)	3 (15%)	20
Total	27	57	29	11	124

Studying these tables we note that in Table 1A, moderate to severe stress ispresent in students universally through Kuppuswamyclasses I to IV. Students in Class I recorded 55%, Class II 53%, Class IV 50%, while students in Class III recordeddisproportionately highest level of stress amounting to73%, indicating the highest stress levels existing in the Lower Middle socioeconomic class.

In Table 1B, a similar study with Depression levels show moderate to severe Depression measuring 36% in students of Class III and 30% in Class II.Thus students belonging to Lower Middle socioeconomic class recorded highest levels of Depression too, while 100% of students in Class IV and 75% of students in Class I show normal to mild levels of Depression.

In Table 1C, moderate to severely high Anxiety levels are noted to be present in highest percentage of students in Class I of 40%, and Class II with 33%; i.e. in students belonging to the highest socioeconomic classes. Conversely students of Class IV recorded lowest Anxiety levels, with 50% normal and 50% suffering from mild anxiety levels.

IV. Discussion

This study was undertaken to address two principal research questions:

1) Given the high prevalence of Stress levels in medical students, does this Stress contribute to the more severe and co-morbid mental illness likeDepression and Anxiety in medical students in India?
2) Does socioeconomic status (SES) really have any effect on Stress, Anxiety & Depression in students?

Burnout among medical students is well documented. A recent study by the Canadian Federation of Medical Students following a survey sent to medical students across the country, reported 37% of Canadian medical students meeting the criteria of burnout, with burnout among residents and staff physicians estimated at 50% or above [18]. Stress dominates the entire course of medical curriculum, thus making the medical students work under continued stress. A study from a Pakistani medical school reported that more than 90% of students felt stressed at one time or the other during their course [19]. In a similar study from Mumbai, India, AN Supe reported that 73% of the students had perceived stress in various stages of MBBS course [20].

We found 54.8% of the first year medical students with high perceived stress levels,and 17.7% of them showing severe stress, in our study.A very similar report by Brahmbhattet al. showedoverall prevalence of stress among medical students to be 42.5% in a medical college in Mangalore,India [21].

A study by Kumar SD among medical students in Mysore reported a prevalence of 37.3% depression and 50.6% anxiety [22]. A systemic review of depression and anxiety among medical students in India by Sarkar S recorded the pooled prevalence rate of depression from 16 studies (n = 3882) being 39.2% (95% confidence interval: 29.0%–49.5%) and the pooled prevalence rate of anxiety from 4 studies (n = 686) being 34.5% (95% confidence interval: 10.1%–58.9%) [23]. We documented moderate to severe degrees of Depression and Anxiety in 27.5% and 32.2% students respectively, quite close to their findings.

Stress has very recently been implicated in causing Anxiety and Depression. The discovery of Nesfatin-1, derived from an 82-amino-acid peptide precursor protein nucleobindin-2 (NUCB2), has been shown to be involved in the stress response as well as in stress-associated anxiety and depression [24].

The Anxiety and Depression Association of America (ADAA) had defined Stress as a response to a threat in a situation, while Anxiety is a reaction to the stress [25].Grillon C et al had shown from animal studies that acute stress potentiates anxiety [26].Our study showed a moderately positive correlation between the Stress and Anxiety scores measured form the medical students, thus proving that persistent high levels of Stress in students may be a cause of Anxiety in some of them.

The Harvard Health Publishing of the Harvard Medical School have implicated stressful life events playing an important role in depression [27]. The Mayo Clinic, USA, have also acknowledged that chronic stress can cause Depression [28].In this studytoo, a moderately positive correlation had been shown to exist between the Stress and Depression scores measured form the medical students.

Thus effective strategies to decrease such high level of Stress in medical students can be introduced to cause a decrease in the highly prevalent levels of Depression and Anxiety in them.

Association of socioeconomic status (SES) with mental illness had been a subject of research throughout the world. Reiss F and Meyrose AK from Germany showed that children and adolescents with a low SESsuffer from multiple stressful life situations and are exposed to a higher risk of developing mental health problems [29]. A similar study by Ochi M et al, showed that in Japan, childhood SES is likely to be positively associated with the lifetime onset of mental disorders, regardless of family history of mental disorders, childhood physical illness, or SES in adulthood [30]. Similar studies to correlate SES with Stress, Anxiety and Depression in medical students in India is lacking.

We used the Kuppuswamy socioeconomic scale, and noted that moderate to severe stress was present in students across all classes of SES, but the highest stress levels existing in the Lower Middle socioeconomic class (Class III), who also suffer from the highest levels of Depression. Moderate to severe levels of Anxiety were noted with maximum prevalence in the highest two socioeconomic classes (Classes I and II). Thus while Anxiety were more prevalent in the Upper socioeconomic classes, Stress and Depression were more found more in the Middle socioeconomic classes. This was in strong contradiction to the popular notion that a low SES is responsible for all mental illness, as inferred from our study on the medical students in Kolkata, India.

V. Conclusion

In this study, 54.8% of the first year medical students recorded high perceived stress levels, with 17.7% showing severe stress.32.2% and 27.5% students were detected with moderate to severe degrees of Anxiety and Depression respectively.Perceived Stress scores showed a moderately strong correlation with Depression and Anxiety levels with highly significant p-values, implicating the role of Stress as a causative agent of the more severe co-morbid conditions like Depression and Anxiety in the medical students.

With a view to answering the question whethersocioeconomic status has any effect on Stress, Anxiety & Depression in medical students, our study employing the Kuppuswamy's socioeconomic status scale on the students found some notable results. Students belonging to the Lower Middle class (Class III) group recorded the highest levels of moderate to severe Stress and Depression. Moderate to severe levels of Anxiety were noted with maximum prevalence in the highest two socioeconomic classes (Classes I and II). Thus while Anxiety were more prevalent in the Upper socioeconomic classes, Stress and Depression were found more in the Middle socioeconomic classes. This negates the popular notion that low SES is responsible for mental illnesses, as shown by previous studies.

Limitations of the study

This study documented stress as an important associate of depression and anxiety in medical students. But a multivariate analysis and search for other factors contributing to depression and anxiety could not be performed in such a short study. Such an analysis with a longitudinal follow-up of these factors over time can pinpoint the causative agents more accurately, and would highly benefit the students suffering from such mental illnesses.

Financial support and sponsorship

Nil.

Conflicts of interest

None.

References

[1]. Willcock SM, Daly MG, Tennant CC, Allard BJ,Burnout and psychiatric morbidity in new medical graduates,*Med J Aust, 181,* 2004, 357-60.

[2]. Kumar SG, Kattimani S, Sarkar S, Kar SS, Prevalence of depression and its relation to stress level among medical students in Puducherry, India, *Ind Psychiatry J, 26,* 2017, 86-90

[3]. Rebello CR, Kallingappa PB, Hegde PG, Assessment of perceived stress and association with sleep quality and attributed stressors among 1styear medical students: A cross-sectional study from karwar, Karnataka, India, *Tzu Chi Medical Journal, 30(4),* 2018; 221–226.

[4]. Tapadar S, Bhattacharyya A, How much stressed are medical students? *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), 18 (4:19),* 2019, 25-30.

[5]. Erschens R, Herrmann-Werner A, et al, Differential determination of perceived stress in medical students and high-school graduates due to private and training-related stressors,*PLoS One, 13(1),* 2018, e0191831, doi.org/10.1371/journal.pone.0191831

[6]. Jafri SA, Zaidi E, et al, Stress Level Comparison of Medical and Non-medical Students: A Cross Sectional Study done at Various Professional Colleges in Karachi, Pakistan,*ActaPsychopathologica, 3(2:8),* 2017, 1-6.

[7]. Nechita F, Nechita D, Pirlog MC, Rogoveanu I, Stress in medical students, *Rom J MorpholEmbryol, 55(3 Suppl),* 2014, 1263–1266.

[8]. Sandal RK, Goel NK, et al,Prevalence of Depression, Anxiety and Stress among school going adolescent in Chandigarh, *J Family Med Prim Care, 6(2),* 2017, 405–410.

[9]. Kumar SD, Kavitha HS, et al, Depression, anxiety and stress levels among medical students in Mysore, Karnataka, India, *Int J Community Med Public Health, 3(1),* 2016, 359-362.
[10]. Cohen S, Kamarck T, et al, A global measure of perceived stress, *Journal of Health and Social Behavior, 24,* 1983, 385-396.
[11]. Cohen S, Williamson G, Perceived stress in a probability sample of the United States in S. Spacapam& S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on applied psychology*(Newbury Park, CA: Sage, 1988) 31-67.
[12]. Spitzer RL, Kroenke K, Williams JB, Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire.., *JAMA.282(18),* 1999, 1737-44.
[13]. Spitzer RL, Kroenke K, Williams JB, et al; A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med, 166(10),* 2006, 1092-7.
[14]. Swinson RP, The GAD-7 scale was accurate for diagnosing generalised anxiety disorder, *Evid Based Med, 11(6),* 2006, 184.
[15]. Adapted by Mayo Foundation for Medical Education and Research. Credits: Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. http://www.phqscreeners.com/pdfs/02_PHQ-9/English.pdf.
[16]. [16]Saleem SM, Modified Kuppuswamy Scale updated for the Year 2018, *Paripex- Indian Journal of Research, 7(3),* 2018, 435-436
[17]. Stangroom J, Linear Regression Calculator, Social Science Statistics, https://www.socscistatistics.com/tests/regression/default.aspx (accessed May 27,2019)
[18]. Glauser W, Medical schools addressing student anxiety, burnout and depression, *CMAJ, 189(50),* 2017, E1569–E1570. doi: 10.1503/cmaj.109-5516
[19]. Shaikh BT, Kahloon A, et al, Students, stress and coping strategies: a case of Pakistani medical school. *Educ Health (Abingdon), 17,*2004, 346-53.
[20]. Supe AN: A study of stress in medical students at Seth G.S.Medical College. *J Postgrad Med* 1998, 44:1-6.
[21]. Brahmbhatt KR, Nadeera VP, Prasanna KS, Jayram S. Perceived stress and sources of stress among medical undergraduates in a private Medical College in Mangalore, India. *IJBAR, 4,* 2013, 128‑36.
[22]. Kumar SD et al, Depression, anxiety and stress levels among medical students in Mysore, Karnataka, India, *Int J Community Med Public Health, 3(1),* 2016, 359-362
[23]. SarkarS, Gupta R, Menon V, A systematic review of depression, anxiety, and stress among medical students in India, *Journal of Mental Health and Human Behaviour, 22(2),* 2017, 88-96.
[24]. Emmerzaal TL, Kozicz T, Nesfatin-1; implication in stress and stress-associated anxiety and depression, *Curr Pharm Des, 19(39),* 2013, 6941-8.
[25]. Anxiety and Depression Association of America (ADAA), https://adaa.org/understanding-anxiety/related-illnesses/stress, (accessed May 27,2019)
[26]. Grillon C, Duncko R, Covington MF, Kopperman L, Kling MA, Acute stress potentiates anxiety in humans, *Biol Psychiatry, 62(10),* 2007, 1183–1186.
[27]. Harvard Health Publishing, Harvard Medical School, https://www.health.harvard.edu/mind-and-mood/what-causes-depression, (accessed May 27,2019)
[28]. Can Chronic stress cause depression? Mayo Clinic, USA,https://www.mayoclinic.org/healthy-lifestyle/stress-management/expert-answers/stress/faq-20058233, (accessed May 27,2019)
[29]. Reiss F, Meyrose AK, Otto C, et al, Socioeconomic status, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study, *PLOS One, 14(3),* 2019, PLoS ONE 14(3): e0213700. https://doi.org/10.1371/journal.pone.0213700
[30]. Ochi M, Fujiwara T, Association of socioeconomic status in childhood with major depression and generalized anxiety disorder: results from the World Mental Health Japan survey 2002–2006, *BMC Public Health, 14,* 2014, 359.

Dr. Shantanu Tapadar. "Correlation of Perceived Stress and Socioeconomic Status with Depression and Anxiety Levels In 1st Year Medical Students In Kolkata, West Bengal, India." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 6, 2019, pp 34-40.