Original Article

Pre-post Intervention Follow-up of Oxidative and Psychological Stress outcomes of Mindfulness Stress Reduction among Medical Professionals

[1]*Dr Rani Srivastava, [2]Dr Jyoti Batra, [3]Dr Ashok Kumar, [4]Dr Alka Agrawal, [5]Dr Yashaswini Srivastava, [6]Aarushi Batra, [7]Mrs Anita Tyagi,

[1]Professor & Head (Clinical Psychology) Santosh Deemed to be University, Ghaziabad,India. drrani8856@gmail.com
[2]Dean-Research, Professor (Biochemistry) Santosh Deemed To Be University, Ghaziabad, India
[3]Professor & Head (Department Of Medicine) , Santosh Deemed to be University, Ghaziabad, India
[4]Professor & Head (Pediatrics), Santosh Deemed To Be University, Ghaziabad, India
[5]MBBS-Intern, Santosh Deemed To Be University, Ghaziabad, India
[6]Final Yr Mbbs ,LLRM Medical College, Meerut,India
[7]Counsellor, (Clinical Psychology), Santosh Deemed to be University, Ghaziabad, India
DOI: 10.47750/pnr.2022.13.S06.020

Abstract

Introduction: Stress among medical professionals is very common & frequent in occurrence now-a-days. Approximately 9.4% of participants working in medical profession were stressed due to their occupation.. The aim of the study was to correlate the psychological variables with oxidative stress (MDA) and to find out the sensitivity so that necessary psychological intervention could be suggested.
Material & method: 78 doctors of Santosh deemed to be University were participated in this study, which was conducted in Department of Clinical Psychology in association with Department of Biochemistry & Medicine, Santosh Medical College & Hospitals, Ghaziabad, UP. MDA was used to measure oxidative stress and Eysenck Personality Questionnaire (EPQ), Sinha Anxiety Scale (SAS) & Depression Scale (DS) & Occupational Stress Index (OSI) were used for psychological evaluation.
ResultsThe mean MDA Score was found higher in doctors posted in hospital Post-assessment results show a significant decrease ($p<0.05$) in MDA scores for all three groups The pre mean anxiety levels were measured these was found increased. Post assessment score for anxiety shows a significant decrease ($p<0.05$) The mean depression score was found to be higher in doctors ,however,post-assessment results show a significant decrease ($p<0.05$) in depression scores .Occupational stress score was found to be higher . Post-assessment results show a significant decrease ($p<0.05$) in depression.
Conclusion : As far as occupational stress is concerned the are moderately stressed in different areas viz: role overload, role ambiguity, role conflict, undesirable group & political pressure, responsibility for persons, under participation, powerlessness, poor peer relations, intrinsic impoverishment, low status, strenuous working conditions etc. Oxidative stress is high among college faculty so it is suspected that in future, they may face thinking and perceptual distortion, and neuroticism and if they get lesser chances of expression they may meet with psychological disturbances.however post intervention their stress levels were reduced significantly

Keywords: Anxiety, Depression, Oxidative stress, Stress.

INRODUCTION

Stress among medical professionals is very common & frequent in occurrence now-a-days. The basic reason is their professional responsibilities make them to deal with humans' health issues & agonies which keep exposing them to negative aspect of life. In other words, we can say that they have to bear these job responsibilities on a regular basis to do the justice by sustained commitments whether they like it or not[1]. A study was conducted in 2008[2] which suggested that 9.4% of participants working in medical profession were stressed due to their occupation. Now the question is what is stress? Stress is an undue, inappropriate, exaggerated response to a situation. It is defined through stress theory[3] as "the non-specific responses of the body to any demand for change".
Apart from many of the doctors being under stress, anxiety & depression, have been found to be reluctant to take the help of mental health professionals if they need, may be because of social taboos/ stigma towards mental disturbances[2].

Stress is any action that places special physical or psychological pressure on a person, which unbalances his individual equilibrium.[4 & 5].
Work related stress is a potential cause of concern in healthcare professionals and is found to be associated with decreased job satisfaction, duties & days off work, anxiety, depression, sleeplessness, medical errors etc[6]. Burnout caused due to stress are prevalent among medical doctors. These situations are normally associated with negative consequences for doctors, patients, and organizations. Mindfulness interventions may provide medical practitioners skills to effectively manage stress and burnout thereby reducing their experience of these symptoms. It is likely that doctors would benefit from the inclusion of such a training program as a part of their general medical education. Chronic overstress often precipitate burnout & emotional disturbance, can lead to anxiety disorders, addictions, depression, eating disorders, and suicide[7, 8 & 9].

Work-related stress is a potential cause of concern in health care workers and is associated with decreased job satisfaction, days off work, anxiety, depression, sleeplessness, medical errors, and near misses[10]. Despite the high prevalence of stress in doctors, and a myriad of physical and mental health consequences, doctors are notoriously reluctant to seek help for themselves. Doctors are also evidence of "poor compliance" due to maladaptive health behaviours [11 & 12].
Malondialdehyde (MDA) is a significant biomarker of oxidative stress. Variations of MDA level in biological systems often represent pathological changes that are related with many types of diseases. Although a variety of techniques have been developed for MDA detection, the probing of this biomarker in living cells remains unexplored. It is believed that the results of this work will be positive to manage the stress among doctors in future. **Malondialdehyde** (**MDA**) is the organic compound. It occurs naturally and is a marker for oxidative stress[13]. Oxidative stress[14] in the human body is just like rust on car which normally reflect number of sign & symptoms related various disorders. Oxidative stress[15] is an imbalance between cellular production of reactive oxygen species and the counteracting antioxidant mechanisms. The brain with its high oxygen consumption and a lipid-rich environment is considered highly susceptible to oxidative stress or redox imbalances. Therefore, the fact that oxidative stress is implicated in several mental disorders including depression, anxiety disorders, schizophrenia and bipolar disorder, is not surprising. Although several elegant studies have established a link between oxidative stress and psychiatric disorders. Another critical aspect that needs much attention and effort is our understanding of the association between cellular oxidative stress and emotional stress. Many studies examine some of the recent discoveries that link oxidative status with anxiety, depression, schizophrenia and bipolar disorder.

Now the question is why does oxidative stress takes place? Oxidative stress is not just age-related change rather it results due to physical/ emotional/ psychological stress, which has a long time stay in humans' body. Of course, there are so many other etiological factors but psychological reasons are here taken into the consideration. In medical profession oxidative stress is a sharp consequence of burnout among medical practioner. Burnout is a syndrome of emotional exhaustion, cynicism, and low professional efficacy that occurs frequently among individuals who are performance oriented[16]. Burnout is defined as a response, which may be inappropriate, to chronic emotional and interpersonal stressors in the workplace & our doctors do face such circumstances in their work place. Ultimately Burnout Syndrome among medical population has the following three dimensions: 1) emotional exhaustion (due to sustained demands), 2) cynicism (indifference/apathetic attitude toward academic activities), and 3) low professional efficacy (perception of incompetence as a professional-(sometimes)[17]. Recently, oxidative stress has also been implicated in depression, anxiety disorders and high anxiety levels. The related findings which establish a link between oxidative stress and pathological anxiety have inspired a number of other recent studies focusing on the link between oxidative status and normal anxiety and also on a possible causal relationship between cellular oxidative stress and emotional stress.

Now the question is how to manage these conditions so that doctors can maintain their wellbeing. Stress plays an important role in mental health outcomes and negatively impacts human system & contributes adverse mental and physical health effects including anxiety, depression, inflammation, increased blood pressure, rapid breathing and many more adverse effects on health. Despite this knowledge, the current health care system provides limited stress management and disease prevention care for overall population & extremely limited help to our doctors. Variety of techniques are there like yoga, deep breathing, muscular relaxation & **mindfulness.**

One of the objectives of this current study was to apply the psychological intervention: **mindfulness** for the management of stress and burnout among medical practitioners at a post-test state. Number of studies[18] on mindfulness

have shown their efficacies. Occupational stress is a well-documented problem in the helping doctors, who are being considered to be at particular risk[19]. Occupational stress occurs when job-related factors interact with individual factors, resulting in a change in the individual's psychological and/ or physiological state[20]. Burnout may be conceptualised as a specific form of occupational stress [21]. It is the chronic depletion of energy as a result of the ongoing emotional demands associated with one's occupation[22].

Mindfulness as a strategy aimed at increasing concentration, awareness, and emotion regulation, mindfulness may hold considerable promise for reducing stress and burnout among doctors. Mindfulness is flexibly implemented, portable, self-directed and non-invasive; all of which are properties likely to be considered attractive for busy practitioners. The efficacy of mindfulness in reducing negative affect in clinical populations has been well demonstrated[23]. Importantly, mindfulness has also demonstrated efficacy in reducing stress among otherwise healthy populations[24]. As such, mindfulness training may be an effective intervention to improve occupational stress and burnout among doctors. With this notion this technique was applied on the participants.

RELEVENCE OF THE STUDY

Stress is inevitable in today's life & in medical profession it is too difficult to handle. As per entire analysis its fact that medical professionals must understand the drawbacks of professional work circumstances. By going through this work our doctors have not only understood their psychological merits & demerits rather they also have come to know about how to overcome & adjust with adversities. The current study found mindfulness training to be an effective means of reducing stress and burnout among these doctors, are working within various medical departments. Implementing mindfulness training and interventions for doctors and doctors in training may have considerable benefits not only for the practitioners, but also their patients and workplaces.

AIMS:

The main aim of this study was to assess the psychological variables (personality dimensions, level of anxiety, level of depression & occupational stress) of doctors & correlating these psychological variables with MDA (oxidative stress) in order to find out the sensitivity so that necessary psychological intervention could be suggested.

OBJECTIVES:

A. To assess the dimensions of personality, level of anxiety, depression & occupational stress index of medical doctors, are working in Santosh University, Ghaziabad, NCR.
B. To estimate the levels of MDA (malondialdehydes) among these above said medical professionals.
C. To correlate the dimensions of personality, level of anxiety, depression & occupational stress index with MDA.
D. To apply psychological interventions (Mindfulness) for the management of stress and anxiety post-test.

MATERIAL & METHODS

The entire population of doctors is 118 (including college, hospital & dental) faculty in entire university. This study was conducted in Department of Clinical Psychology in association with Department of Biochemistry & Medicine, Santosh Medical College & Hospitals, Ghaziabad, UP. within the period of August, 2020 to January, 2021. It is a single arm longitudinal, intervention-based study. The medical professionals (faculties of medical college, medical hospital & dental college-22+35+15=72 doctors respectively) of Santosh Deemed to be University, NCR, Delhi came forward for such investigation. Sampling is Purposive in nature. All intended medical professionals (faculty) gave their written consent for this project. Those medical professionals who had any heart disease, kidney disease, bone disease, depression and high anxiety levels were excluded from the study. Even those doctors who were unwilling for testing they were also excluded. Regarding psychological evaluation all standardized test measures were used: namely; Eysenck Personality Questionnaire (EPQ), Sinha Anxiety Scale (SAS) & Depression Scale (DS) & Occupational Stress Index (OSI).

Procedure: All the doctors were requested to fill up the questionnaires individually in a confidential manner. Ethical clearance was also obtained from institutional ethical committee.

Biochemical estimations:

Estimation of Serum Lipid Peroxidation by measuring the levels of MDA (Kei Satoh)

Principle: In this method, serum and TBA are heated together to form chromogen. The chromogen then extracted with n-butyl alcohol, and the reading of organic phase was noted at a wavelength of 530 nm. The determined values were expressed as nmol/ml.

RESULTS

TABLE-1- Gender wise distribution of study participants

		Faculty Type		
		MEDICAL COLLEGE	HOSPITAL	DENTAL COLLEGE
No. Psychological Test	Male	07	17	07
	FEMALE	15	18	08
No. Of Blood Test	Male	07	14	06
	FEMALE	13	17	07

TABLE-2 Pre Assessment of Oxidative and Psychological Stress Parameters-

Faculty Type			
	MEDICAL COLLEGE	HOSPITAL	DENTAL COLLEGE
MDA	4.78 + 1.07	5.87 + 3.99	4.30 +.86
EPQ-PERSONALITY – P	4	3	4
EPQ- PERSONALITY- E	13	12	14
EPQ-PERSONALITY- N	7	7	9
EPQ-PERSONALITY- L	15	14	21
ANXIETY	14 + 9.9	16.65 + 14	18 + 15.17
DEPRESSION	3.18 + 1.9	4.10 + 2.99	2.43 + 4.8
OCCUPATIONAL STRESS	112 +19	126 + 3.99	104 + 22.3

TABLE-3 Post Assessment of Oxidative and Psychological Stress Parameters-

Faculty Type			
	MEDICAL COLLEGE	HOSPITAL	DENTAL COLLEGE
MDA	2.49 + 1.47	2.33 + 4.45	2.11 +1.22
EPQ-PERSONALITY – P	4	3	4
EPQ- PERSONALITY- E	9	11	8
EPQ-PERSONALITY- N	5	6	5
EPQ-PERSONALITY- L	12	13	12
ANXIETY	9.39 + 4.9	10.85 + 18.3	17.51 + 9.12
DEPRESSION	2.34 + 2.6	2.98 + 3.28	2.11 + 2.1
OCCUPATIONAL STRESS	92 +16.5	110 + 6.57	90 + 9.38

TABLE-4 Correlation between Oxidative and Psychological Stress Parameters-(Pearson's Correlation)

Faculty Type			
	MEDICAL COLLEGE	HOSPITAL	DENTAL COLLEGE
EPQ-PERSONALITY – P	0.54	0.01	0.11
EPQ- PERSONALITY- E	0.16	0.30	0.56
EPQ-PERSONALITY- N	0.22	0.04	-0.15

EPQ-PERSONALITY- L	0.13	0.16	0.01
ANXIETY	0.38	0.25	0.37
DEPRESSION	0.26	0.45	0.29
OCCUPATIONAL STRESS	0.22	0.13	-0.05

118 Doctors were recruited for the study, however, only 78 subjects participated till the completion of the study. It is a matter of concern that despite being trained as medical doctors there seems to be a reservation to come forward boldly for psychological investigation[2, 4 & 5]. On analysing the population of doctors, 22 doctors from college (male/female 7+15=22), 35 in hospital male/female 17+18=35), from dental science (male/female 7+8=15). Gender-wise lady doctors were found to be more approachable than male doctors[2].

The levels of MDA which is a measure of oxidative stress initially were found to be increased. The mean MDA Score was found higher in doctors posted in hospital (4.78), medical college (5.87) and dental college (4.30) respectively (table-2). Post-assessment results show a significant decrease ($p<0.05$) in MDA scores for all three groups and higher in doctors posted in hospital (2.49), medical college (2.33) and dental college (2.11) respectively (table-3). The mean anxiety among these was found higher in the dental college (18) group, hospital (16.65) and medical college (14.99) respectively (table-2). Post assessment score for anxiety shows a significant decrease ($p<0.05$) in Medical college (9.39) and hospital (10.85) but not a significant decrease ($P>0.05$) in dental college (17.51) (table-3). The mean depression score was found to be higher in doctors posted in hospital (4.10), medical college (3.18) and dental college (2.43) respectively (table-2). Post-assessment results show a significant decrease ($p<0.05$) in depression scores for all three groups and higher in doctors posted in hospital (2.98), medical college (2.34) and dental college (2.11) respectively (table-3). Occupational stress score was found to be higher in doctors posted in hospital (110), medical college (92) and dental college (90) respectively (table-2). Post-assessment results show a significant decrease ($p<0.05$) in depression scores for all three groups and higher in doctors posted in hospital (110), medical college (92) and dental college (90) respectively (table-3).

Personality-wise analysis shows that in general doctors are free from psychotic dimensions. They are intended for extraversion. They are free from neuroticism also. On the lie scale (L) they seem to carry a high score which shows they have normal personality patterns, high social desirability, manipulative tendencies & naivety. As far as their level of anxiety is concerned the doctors of dental science are found to be carrying a bit higher anxiety in comparison to the doctors of College & Hospital[4 & 5]. On measuring the level of depression, they were found to be free of this pathology. In conclusion, the doctors are emotionally sensitive, impulsive, manipulative and anxious. Their personality traits have been related to higher levels of anxiety symptoms, symptoms of depression and stress reactions, while neuroticism only predicted stress reactions. Furthermore, the trait extroversion protected against symptoms of depression[24]. Here the results are almost similar.

A person's Correlation between oxidative stress and psychological stress parameters was calculated for all three groups. The correlation coefficient (r) was found to be positive for all the groups with the personality-EPQ scale except the dental college group with personality-EPQ (N). Also with anxiety, depression and occupational stress, MDA shows a positive correlation except dental college shows a weak negative (-0.05) correlation with MDA (table-4).

CONCLUSION

In conclusion, the doctors are genuinely emotionally, sensitive & anxious personality-wise. As far as occupational stress is concerned the doctors from college & dental science are moderately stressed in different areas viz: role overload, role ambiguity, role conflict, undesirable group & political pressure, responsibility for persons, under participation, b powerlessness, poor peer relations, intrinsic impoverishment, low status, strenuous working conditions, & unprofitability). On the contrary doctors from hospitals are mildly stressed on occupational stress index, which may be due to having better coping & tolerance, moreover, looking after OPD & IPD responsibilities performing on a regular basis make them better adaptive person but definitely, all the doctors need to follow stress management strategies in future. As far as occupational stress is concerned the doctors from college & dental science are overall stressed on & sub-area wise: (role overload, role ambiguity, role conflict, undesirable group & political pressure, responsibility for persons, under participation, powerlessness, poor peer relations, intrinsic impoverishment, low status, strenuous working conditions, & unprofitability). On the contrary doctors from hospitals are mildly stressed on occupational stress index[6, 7, 8, & 9]. It was noticed that the entire faculty is carrying a very high level of oxidative stress and the score is highest among hospital faculty then followed by a lesser high among dental faculty and the

college faculty. The reason is hospital & dental faculty always remain under pressure due to clinical work & emergencies while college faculty is having little less pressure.

When the MDA was correlated with personality dimensions a positive correlation was found between MDA and P, E, and N, (psychoticism, extroversion, neuroticism) respectively and a negative correlation was found between MDA and lie scale. It means since oxidative stress is high among college faculty so it is suspected that in future, they may face thinking and perceptual distortion, and neuroticism and if they get lesser chances of expression they may meet with psychological disturbances. This study raises concerns about the long-term influences of oxidative stress on the health of health professionals because oxidative stress has been implicated in the pathophysiology of a large number of diseases[25]

Contemporary healthcare is challenging and complex. It is fact that mindfulness interventions may provide medical practitioners with skills to effectively manage stress and burnout, thereby reducing their experience of these symptoms. Further studies with larger sample sizes using rigorous research methods would be useful in extending this work. It is likely that doctors would benefit from the inclusion of such a training program as a part of their general medical education.

Declaration: ***THIS INVESTIGATION STUDY HAS BEEN CONDUCTRD UNDER SEED MONEY PROJECT BY SANTOSH DEEMED TO BE UNIVERSITY (2020-21)***

Conflict of Interest:None

REFERENCES

1. Familoni, O.B. (2008) An overview of stress in medical practice, Afr Health Sci**. 2008 Mar; 8(1): 6–7**
2. Dr. Saranya Nagalingam, Annamalai Sowmiya, Dr. Balaji Arumugam, 2008, Stress in Medical Profession Global Journal of Medical Research, [S.l.], mar. 2019. ISSN 2249-4618. Available at: https://medicalresearchjournal.org/index.php/GJMR/article/view/1718>. Date accessed: 13 Mar. 2020.
3. Selye H. The Stress of Life. 1956; New York McGraw-Hill Book Company.
4. Fugelli P. The burned-out physician. Nord Med 1987;102(12):360-362.
5. Wong JG. Doctors and stress. Med Bull 2008 Jun;13(6):4-7.
6. Arvind Kushal & Madhav Madhududan (2018) Study of Stress among Health Care Professionals: A Systemic Review. https://www.researchgate.net/publication/327794465
DOI: 10.5005/jp-journals-10035-1084 CITATIONS
7. Michael J. Ireland,Bonnie Clough,Kim Gill,Fleur Langan,Angela O'Connor &Lyndall Spencer, (2017), A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners. Pages 409-414 | Published online: 28 Feb 2017. (https://doi.org/10.1080/0142159X.2017.1294749.
8. Myers, M. Depression and anxiety. In: Goldman LS, Dickstein L, editors. The handbook of physician health. Chicago (IL): AMA Press; 2000. pp. 80-94.
9. Cromie, WJ. Suicide high among female doctors. Cambridge (MA): The Harvard Gazette; 2005.
10. Kushal A, Gupta SK, Mehta M, Singh MM. Study of Stress among Health Care Professionals: A Systemic Review. Int J Res Foundation Hosp Healthc Adm 2018;6(1):6-11.
11. Pearson, C. New study shows high rate of stress among doctors. Washington (DC): VOA News; 2009. [cited 2009 Sep 26]. Available from: http://www.voanews.com/ english/2009-09-26-voa3.cfm.
12. Dasgupta H, Kumar S. (2009) Role stress among doctors working in a government hospital in Shimla (India). Eur J Soc Sci, Sep;9(3):356-370.
13. V. Nair, C. L. O'Neil, P. G. Wang "Malondialdehyde", *Encyclopedia of Reagents for Organic Synthesis*, 2008, John Wiley & Sons, New York. doi:10.1002/047084289X.rm013.pub2.
14. Doni (2015) Oxidative stress: What is it & can it affect your health?
15. Samina Salim (2014) Oxidative stress and psychological disorders. Curr Neuropharmacol. Mar;12(2):140-7, 10.2174/1570159X11666131120230309.
16. Carlotto MS, Camara SG. Características psicometricas do Maslach Burnout Inventory Student Survey (MBI-SS) em estudantes universitários brasileiros. Psico USF. 2006;11(2):167-73, http://dx.doi.org/10.1590/S1413-82712006000200005. [Links]
17. Maslach C, Jackson SE. The measurement of experienced burnout. J Occup Behav. 1981;2(2):99-113,http://dx.doi.org/10.1002/job.4030020205. [Links]
18. Michael James Ireland, Bonnie A Clough, Bonnie A Clough & Bonnie A Clough (2017) A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners, Medical Teacher 39(4), Project: Working Well: Investigation and Intervention into Drs Wellbeing-DOI:10.1080/0142159X.2017.1294749
19. Coomber S, Todd C, Park G, Baxter P, Firth-Cozens J, Shore S. 2002. Stress in UK intensive care unit doctors. British Journal of Anaesthesia. December 1, 2002;89:873-881.
20. Richardson KM, Rothstein HR. 2008. Effects of occupational stress management intervention programs: a meta-analysis. Journal of occupational health psychology.13:69.
21. Schaufeli WB, Leiter MP, Maslach C. 2009. Burnout: 35 years of research and practice. Career development international.14:204-220.
22. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, West CP, Sloan J, Oreskovich MR. 2012. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Archives of internal medicine.172:1377-1385.
23. Hofmann SG, Sawyer AT, Witt AA, Oh D. 2010. The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. Journal of consulting and clinical psychology.78:169.

24. Chiesa A, Serretti A. 2009. Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. The journal of alternative and complementary medicine.15:593-600.
25. Rani Srivastava, Jyoti Batra (2014) (Industrial Psychiatry Journal 127 Jul-Dec 2014 | Vol 23 | Issue 2,p 127-133.