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Correlation Between Burnout Syndrome and Estimation of Aerobic Capacity in Resident Doctors

Sushama A. Bhandare[1], Yuvraj N Athole[2], Krupa N. Kataria[3]

[1]Assistant Professor, Department of Physiotherapy, Seth GSMC & KEMH, Mumbai, India
[2,3] Postgraduate Student, Department of Physiotherapy, Seth GSMC & KEMH, Mumbai, India

Corresponding Author: Sushama A. Bhandare

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ABSTRACT

Background: The prevalence of Burnout syndrome has increased over the last few years. The syndrome is experienced by resident doctors, who treat mild to serious illnesses and have to handle emergencies. They have long working hours including surgeries. Work-related stress among healthcare professionals has become a serious health problem and it was found that higher levels of burnout syndrome impacted work capacity and cognition. It is important to analyze the correlation between burnout syndrome and aerobic capacity in resident doctors. This will help physiotherapists gain a more comprehensive analysis of the resident doctor's health status and help to incorporate preventive intervention and control the risks of another exhaustion/stress-related syndrome.
Material and method: This cross-sectional study was conducted on 58 resident doctors including 42 males & 16 females. The Maslach burnout inventory scale was used to determine burnout syndrome, and 6 MWT was used to measure aerobic capacity. The statistical analysis was performed with Spearman's correlation coefficient.
Result: The analysis revealed a statistically significant moderate negative relationship between the Vo2 max and EE ($r = -0.521$, $p < 0.0005$), a moderate negative relationship between the Vo2 max and DP ($r = -0.429$, $p = 0.001$), and a very weak positive relationship between the Vo2max and PA ($r = 0.304$, $p = 0.020$). This shows a correlation between a change in Vo2 max scores and mildly impacted personal achievement as well as moderate Emotional exhaustion and depersonalization.
Conclusion: The study thus concluded that participants with lower aerobic capacity showed a high degree of burnout. Therefore, this study concludes that there is a correlation between aerobic capacity and burnout syndrome in resident doctors.

Keywords: Depersonalization (DP), Emotional exhaustion(EE), Personal accomplishment (PA), Maslach burnout inventory (MBI).

INTRODUCTION

The prevalence of Burnout syndrome has increased over the last few years. The syndrome is experienced by resident doctors, who treat mild illnesses to serious illnesses in emergencies. They have long working hours including surgeries. It is important to analyze this burnout syndrome to increase knowledge regarding the potential risks faced by medical professionals. Burnout syndrome was first described in 1974 among healthcare volunteers. It is conceptualized as resulting from chronic workplace stress that has not been successfully managed it is characterized by feelings of energy

depletion, increased mental distance from one's job and reduced professional efficacy (WHO)[24].

According to Maslach, Burnout syndrome consists of three components**:** Emotional exhaustion (occupational overextension and work-related exhaustion), Depersonalization (negative, callous, and detached responses to others), and Personal accomplishment (fulfilment in the workplace and a positive view of professional achievements. It is a balance between Emotional exhaustion and Depersonalization if it occurs).[7]

Specific factors that predispose resident doctors to burnout syndrome are long working hours, numerous work shifts, sleep deprivation, compromising food timing and no time for exercise. Burnout is associated with diminished self-efficacy, lower cognitive functioning, poor work performance, and more likely to develop cardiovascular diseases.[3]

Several personality traits have been investigated in an attempt to determine who is more likely to experience burnout. Burnout scores are greater among people who have low levels of hardiness (involvement in daily activities, a sense of control over events, and openness to change), especially on the exhaustion component. People with an external locus of control (attributing events and accomplishments to powerful persons or chance) are more likely to burn out than those with an internal locus of control (attributions to one's ability and effort).[14]

Cardio-respiratory fitness, also called cardiovascular fitness or maximal aerobic power, is the overall capacity of the cardiovascular and respiratory systems and the ability to carry out prolonged strenuous exercise. The World Health Organization has long considered the maximal oxygen consumption (VO2 max) achieved during a graded maximal exercise to voluntary exhaustion as the single best indicator of cardiorespiratory fitness. VO2 max is the maximum amount of oxygen a person can intake and the value does not change despite an increase in workload over the period. Although VO2 max has been expressed in a variety of ways, the most common is the volume of oxygen consumed per unit of time about body mass (ml/min/kg).[15]

The structural theory of burnout considers that burnout is a response to chronic job stress that appears when the coping strategies employed by the individual to manage job stressors fail. Initially, work stress will elicit a series of coping strategies. When the coping strategies initially employed are not successful, they lead to professional failure and the development of feelings of low personal fulfilment at work and exhaustion. Faced with these feelings, the subject develops Depersonalization attitudes like negative, callous, and detached responses to others as a new form of coping. In turn, burnout will have adverse consequences both for the health of individuals and for organizations.[7]

In normal physiology, three structures modulate the response to stress: the paraventricular nucleus (PVN) of the hypothalamus, the anterior pituitary gland, and the cortex of the adrenal gland. Together these structures are referred to as the hypothalamic-pituitary-adrenal (HPA) axis. The HPA axis plays a central role in the regulation of adrenal hormones that help to preserve or restore homeostasis.[16]

The Burnout syndrome alters the cardiovascular function and its neuro-regulation by the autonomic nervous system and is associated with increased sympathetic tone to heart and vessels after mental stress, lowered physiological post-stress vagal rebound to heart and lowered arterial baroreflex sensitivity[5].

A recent case-control study in Taiwan found that working long hours increased the risk of cardiovascular disease in middle-aged men, particularly those who worked more than 60 hours per week. In a Japanese case-control study, those working 61 hours or more per week were found to have a 2-fold higher risk of nonfatal MI compared with workers who worked less than 40 hours per week. [19] So, the objective of the present study is to find out the correlation between

burnout syndrome and aerobic capacity in resident doctors.

MATERIALS & METHODS

This cross-sectional study was approved by the Institutional Ethics Committee. Participants included were Clinical resident doctors between the ages of 25-35 who had completed at least 6 months of residency. Participants with cardiorespiratory, musculoskeletal, or neurological disorders, recent injury, or smoking history were excluded. Written informed consent was taken from the participants. Sample collection was done by using the convenient sampling method with a sample size of 58. Burnout syndrome will be determined by the Maslach burnout inventory scale and aerobic capacity (Vo2 max) will be determined by a 6-minute walk test. As data was not normally distributed the correlation was calculated based on the Spearman Correlation test.

STATICAL ANALYSIS

The data was analysed using SPSS software version 26. Normality was tested using the Shapiro-Wilk test, and as the data was not normally distributed, the Spearman Correlation test was applied.

RESULT

A total of 58 participants participated in the study of which 16 (28%) were females and 42 (72%) were males between the ages of 25 and 35, with a mean age of 28.96 ± 2.47 years.

Table 1: Gender-wise Distribution of the study participants

Gender	N	Per cent
Male	42	72.4%
Female	16	27.6%
Total	58	100%

Table 2: Descriptive statistics of study participants (Mean ± SD)

	Observed Vo2 max	EE	DP	PA	Expected Vo2 max
Male	41.28 ml/kg/min	29.19	14.26	25.2	45.76 ml/kg/min
Female	38.32 ml/kg/min	27.26	11.8	24.8	41.30 ml/kg/min
Average	40.43±4.15 ml/kg/min	28.8±12.2	13.5±6.68	24.9±8.9	42.53 ml/kg/min

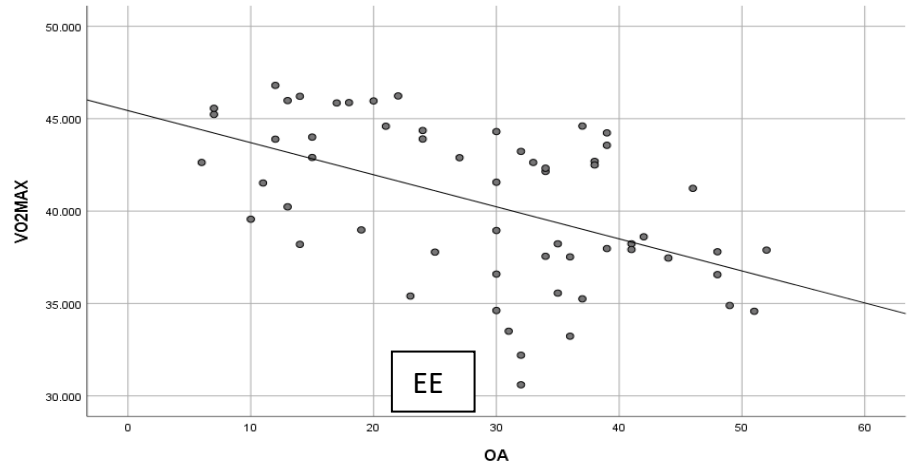
Table 3 Correlation between VO2 max and domains of burnout syndrome

	VO2 Max	EE	DP	PA
Spearman's Rho correlation coefficient (VO2 Max)	1.000	-0.521*	-0.429*	-0.304*
Sig. (2- tailed)	000	**0.000**	**0.001**	**0.020**
N	58	58	58	58

*** . Correlation is significant at the 0.05 level (2- tailed).**

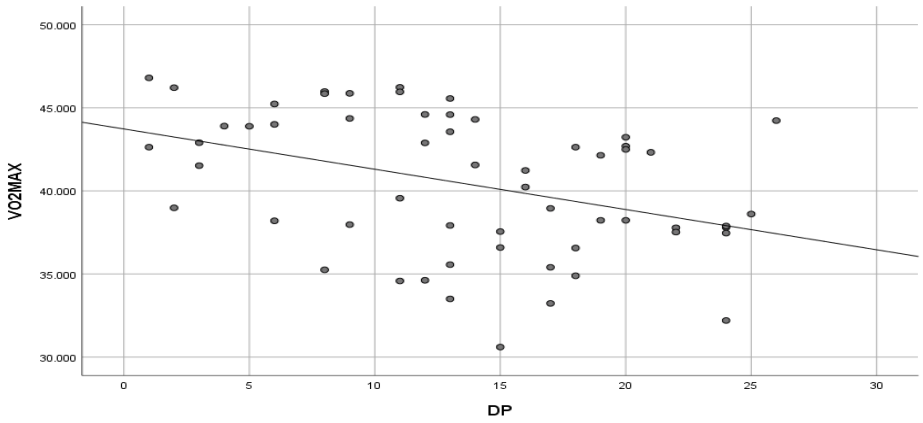
The Spearman correlation coefficients were calculated to examine the associations between Vo2 max and three variables: EE, DP, and PA. The analysis revealed a statistically significant moderate negative relationship between the Vo2 max and EE ($r = -0.521$, $p < 0.0005$), a moderate negative relationship between the Vo2 max and DP ($r = -0.429$, $p = 0.001$) and a very weak positive relationship between the Vo2 max and PA ($r = 0.304$, $p = 0.020$).

Graph 2 Correlation between VO2 max and Emotional exhaustion.



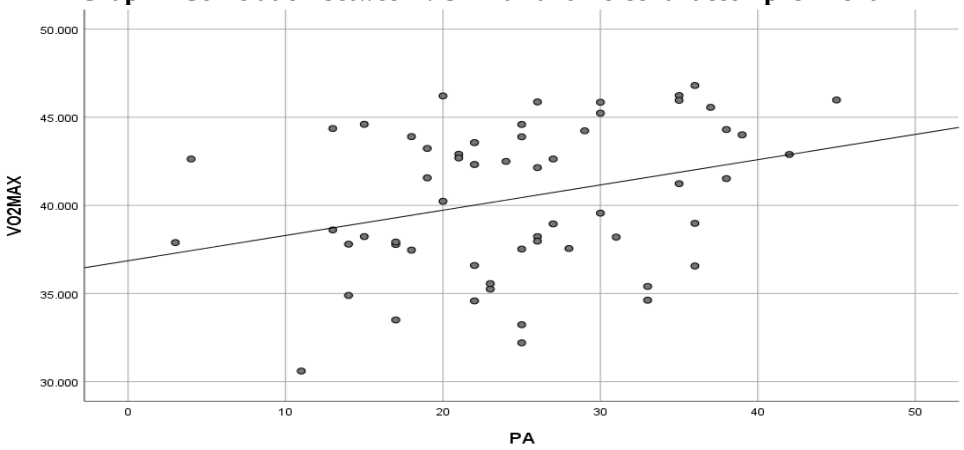
Statistical interpretation: When Vo2 max and EE score were correlated, a moderate negative correlation (r = -0.521) of statistical significance (P < 0.005) was found.

Graph 3 Correlation between VO2 max and Depersonalization



Statistical interpretation: When Vo2 max and DP score were correlated, a moderate negative correlation (r = -0.429) of statistical significance (P = 0.001) was found.

Graph 4 Correlation between VO2 max and Personal accomplishment



Statistical interpretation: When Vo2 max and PA score were correlated, a very weak positive relationship correlation (r = 0.304) of statistical significance (P = 0.020) was found.

DISCUSSION

This study investigated the relationship between Burnout syndrome and aerobic capacity in resident doctors. 58 individuals (42 males and 16 females) between the ages of 25 and 35, with a mean age of 28.96 ± 2.47 years and mean working hours of 16.64 ± 4.12 hr, were recruited for the study based on the inclusion and exclusion criteria. The participants were explained the study protocol and the purpose of the study, and written consent was obtained from them. The Maslach burnout inventory scale was used to determine burnout syndrome, and 6 MWT was used to measure aerobic capacity. Using the data obtained from the test, predicted vo2 max was calculated from Burr et al.'s equation for determining Aerobic capacity. The Maslach Burnout Inventory Scale uses three domains to assess burnout syndrome Emotional exhaustion, Depersonalization, and Personal accomplishment. The mean vo2 max value was 40.23ml/kg/min, whereas the normal mean vo2 max score for males is 45.76ml/kg/min and for females is 41.30ml/kg/min in the 18–40-year age group[45]. Accordingly, the mean score for emotional exhaustion was 20.8 (moderate degree burnout), while the scores for depersonalization and personal accomplishment were 13.5 (high degree burnout) and 24.9 (high degree burnout) respectively. Since some of the data was not normally distributed, a nonparametric test, i.e., Spearman's rank correlation coefficient test, was used to determine correlation. The analysis revealed a statistically significant moderate negative relationship between the VO2max and EA ($r = -0.521$, $p < 0.0005$), a moderate negative relationship between the VO2max and DP ($r = -0.429$, $p = 0.001$), and a very weak positive relationship between the VO2max and PA ($r = 0.304$, $p = 0.020$). This shows a correlation between a change in vo2 max scores and mildly impacted personal achievement domain as well as moderate EE and DP domains.

The study results showed that among all the three dimensions of burnout, the domains of Depersonalization and Personal Accomplishment seemed to be highly affected in all the participants. In total, 55% of the participants experienced a high degree of burnout in EE, 62% of participants reported a high degree of DP and 79% of participants had low PA. This demonstrates that the majority of residents were lacking in empathy, which had an impact on their ability to feel fulfilled at work and professional accomplishments. Similar results were seen by Langade et al on Indian doctors. In this study, 65.98% of people had high scores on the depersonalization scale and 45.02% of participants had high scores on the emotional exhaustion scale on the Maslach burnout inventory[33]. Low levels of PA scores in the present study (79%) were somewhat comparable to the study from Turkey. In this study High level of EE was recorded in 37.4%, a high level of DP in 45.6%, and a low level in perceptions of PA in 50.3% of respondents.[27]

Burnout among HCPs has been associated with depression, anxiety, alcohol abuse, deterioration in health, and suboptimal patient care. Burnout and aerobic capacity in HCP have been studied widely in developed countries, but there is a paucity of literature about the same in the Indian context. The previous study by Deepakkumar G. Langade and colleagues conducted a cross-sectional survey among 482 qualified medical practitioners across India. A questionnaire consisting of 25 socio-demographic and occupational questions related to MBI and BCSQ-12 scales was used to assess burnout. The entire population consistently displayed high levels of burnout. All these values revealed high levels of burnout among qualified medical practitioners in India. This study underscores the importance of addressing burnout and its associated factors within the medical profession to improve overall well-being and the quality of healthcare services.[33].

A Systematic Review and Meta-Analysis conducted among Healthcare Professionals

in India by Vartika Kesarwani. The researchers found that a total of 15 studies assessing burnout in 3845 Indian Health Care Professionals were identified. The pooled prevalence of burnout was 24% in the EE domain, 27% in the DP domain, and 23% in the PA domain. Younger age, female gender, unmarried status, and difficult working conditions were associated with an increased possibility of burnout[28].

Melamed et al. state that possible mechanisms connecting burnout to cardiovascular diseases include associations with metabolic syndrome elements, dysregulation of the HPA axis, inflammation, sleep issues, lowered immunity, changes in blood coagulation, changes in fibrinolysis, and adoption of unhealthy lifestyle choices like smoking, drinking and physical inactivity[4].

While no other studies have compared the relationship between burnout syndrome and aerobic capacity in healthcare professionals, some studies compared the association of Cardiorespiratory fitness against the stress-related symptoms of burnout and depression [22,27]. A study was carried out by Markus Gerber et, al on 197 participants with a mean age of 39.2 years. According to the study participants with low cardiopulmonary fitness levels report higher symptoms of burnout and depression. However, among those who expressed significant levels of stress, there is a particularly strong link between cardiorespiratory fitness and mental health.[9]

In this day and age, Burnout constitutes a serious risk to the sustainable health of employees of today's organizations. Therefore, great effort should be made to reduce this syndrome[40]. Regular physical activity may also increase people's self-efficacy which may "spill over" to the work domain. As a result, employees may feel more competent in coping with their work tasks, and as such experience these tasks as being less demanding. As regards physiological processes, it has been proposed that engaging in regular physical activity improves one's capacity to cope with psychological stress. Cardiovascular exercise tended to be better than resistance exercise when it came to reducing psychological distress[33]. This study observed that subjects with better CRF showed good coping strategies for burnout syndrome.

CONCLUSION

Participants with lower aerobic capacity showed a high degree of burnout. Therefore, this study concludes that there is a correlation between aerobic capacity and burnout syndrome in resident doctors.

Declaration by Authors

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