

**IMPACT OF CARDIORESPIRATORY FITNESS ON SELECTED  
PULMONARY CARDIOAUTONOMIC AND NEUROCHEMICAL  
MARKERS**

An Abstract

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## Abstract

Recent studies have looked at fitness, lung function, heart rate variability (HRV), and neurochemical markers, but primarily in isolation and mainly in response to exercise training. There has been no research examining how VO<sub>2</sub> max, lung function, HRV, and neurochemical markers are interconnected or how they naturally vary with fitness levels in healthy young adults.

The researcher used Pearson's correlation (bivariate normal model) in this cross-sectional study to examine relationships between VO<sub>2</sub>max and multiple physiological markers. A total of 115 regularly active B.P.Ed. and M.P.Ed. students (mean age 23.53 ± 1.43 years) were selected through convenience sampling. VO<sub>2</sub>max represented cardiorespiratory fitness, pulmonary efficiency was assessed through PFT, cardio autonomic function through HRV indices, and neurochemical status through ELISA-based measurements of GABA, BDNF, and cortisol.

VO<sub>2</sub>max showed significant positive correlations with pulmonary measures: FEV-1 ( $r=.219$ ,  $p=.019$ ), FEV-3 ( $r=.192$ ,  $p=.040$ ), and VC ( $r=.399^{**}$ ,  $p=.000$ ). For HRV time-domain metrics, VO<sub>2</sub>max correlated with RMSSD ( $r=.196^*$ ,  $p=.036$ ) and Mean RR ( $r=.219^*$ ,  $p=.019$ ), while Mean HR showed no association ( $r=-.003$ ,  $p=.975$ ) whereas pNN50 and SDNN showed non-significant but positive trends. In the frequency domain, VO<sub>2</sub>max correlated with HF (nu) ( $r=.335^{**}$ ,  $p=.000$ ) and HF power ( $r=.343^{**}$ ,  $p=.000$ ), and negatively with LF (nu) ( $r=-.265^{**}$ ,  $p=.004$ ) and LF power ( $r=-.338^{**}$ ,  $p=.000$ ). LF/HF showed a modest positive correlation ( $r=.203^*$ ,  $p=.030$ ). Regarding neurochemicals, VO<sub>2</sub>max exhibited a significant positive association with GABA ( $r=.393^*$ ,  $p=.020$ ), whereas BDNF showed a non-significant positive trend ( $r=.241$ ,  $p=.164$ ). Basal cortisol demonstrated a nonsignificant negative relationship ( $r=-.075$ ,  $p=.667$ ).

Overall, higher VO<sub>2</sub>max reflects a well-integrated physiological profile marked by efficient pulmonary function, balanced autonomic activity, and neurochemical patterns supportive of stress resilience and neural health.

**Key-words:** Cardiorespiratory fitness, Pulmonary function, Cardio autonomic function, Neurochemical marker, Regular Physical exercise