

Predictors of Cardiometabolic Disease Risk Factors in Professional Firefighters

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ABSTRACT

The leading cause of mortality (~50% of deaths) among on-duty firefighters is sudden cardiac death. Firefighters with adequate cardiorespiratory fitness levels (among other muscular fitness metrics) and lower body fat percentage (BF%) are likely to better combat on-duty cardiac events and cardiovascular disease (CVD) risk. Individuals with higher VO₂max values may be at lower risk noted by lower oxidative stress and inflammatory biomarkers, which may be more ideal predictors of CVD risk compared to traditional biomarkers (i.e., blood glucose and lipids) among the fire community; however, more research is needed to elucidate. **PURPOSE:** This study examined the relationship between fitness metrics, body fat percentage, and traditional and non-traditional biomarkers among professional firefighters. **METHODS:** Ninety-eight professional, male firefighters (age = 36.26 ± 9.08 yrs; height = 179.53 ± 7.06 cm; waist circumference = 37.99 ± 4.13 cm; BF% = 24.39 ± 5.21; years of experience = 11.81 ± 8.00 yrs) from a local fire department were studied. VO₂max was estimated from total treadmill exercise time using the Foster equation. Fitness metrics including muscular strength, endurance, and power variables were also measured. Fasted blood samples were analyzed for concentrations of lipids, glucose, insulin resistance (HOMA-IR), advanced oxidation protein products (AOPP), and ultra-sensitive C-reactive protein (CRP). To assess the relationship between fitness metrics and AOPP, CRP, and HOMA-IR, ordinary least square regression analyses were used. **RESULTS:** VO₂max values were inversely ($p < 0.05$) related to AOPP, HOMA-IR, and CRP. Waist circumference was positively correlated to AOPP concentrations and HOMA-IR, while increased BF% was significantly related to increased CRP concentrations. **CONCLUSION:** High VO₂max values were significantly related to lower AOPP, CRP, and HOMA-IR. Additionally, high waist circumference and BF% values were related to increases in oxidative stress, inflammation, and insulin resistance. Firefighters are encouraged to maintain high cardiorespiratory fitness (VO₂max) and lower BF% to reduce CVD and, ultimately, on-duty sudden cardiac death risk.