Impact of Cardiorespiratory Fitness on Markers of Cardiovascular Disease in Professional Firefighters

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ABSTRACT

Cardiovascular disease (CVD) is the leading cause of mortality among firefighters. Higher cardiorespiratory fitness (CRF) levels (VO_{2max}) are associated with lower oxidative stress and inflammatory markers in addition to lower CVD risk; however, there are a lack of data examining this relationship among firefighters. **PURPOSE**: To examine differences in markers of CVD risk between firefighters classified as having either high or low levels of CRF. **METHODS**: Forty-six professional firefighters performed a maximal graded exercise test, where VO_{2max} was estimated from the Foster equation. Fasted blood samples were also taken to assess biomarkers of CVD risk: HDL, LDL, glucose, cholesterol, triglycerides, advanced oxidation protein products (AOPP), homeostatic model assessment for insulin resistance (HOMA-IR) and C-reactive protein (CRP). Body fat percentage (BF%) was determined via Dual-Energy X-Ray Absorptiometry (DEXA). VO_{2max} values were categorized based on American College of Sports Medicine (ACSM) guidelines to establish a high fitness group (n=19; VO_{2max} = 44.7 ± 5.2 ml·kg^{-1}·min^{-1}) and a low fitness group (n=27; VO_{2max} = 28.2 ± 4.9ml·kg^{-1}·min^{-1}). Non-parametric Mann-Whitney U tests were used to assess differences in CVD risk markers between the high and low fitness groups. Effect sizes were calculated as Cohen's d (i.e., small [0.2-0.5], medium [0.5-0.8], large [> 0.8]). **RESULTS**: Participants demonstrating high CRF had significantly ($p < 0.05$) higher HDL concentrations coupled with significantly lower BF%, cholesterol, triglycerides, LDL, insulin, HOMA-IR, CRP, and AOPP. Half of the observed differences demonstrated a medium effect size (LDL, insulin, HOMA-IR, CRP, and AOPP), while large effect sizes were noted for VO_{2max}, BF%, cholesterol, triglycerides, HDL, LDL/HDL risk ratio. **CONCLUSION**: The high fitness group exhibited lower CVD risk levels and higher HDL levels compared to the low fitness group. Considering these results, firefighters are encouraged to maintain high CRF to reduce the risk of CVD and on-duty cardiac events.