

Practicing Outdoor Physical Activity is it really a good choice? A literature review on the association among physical activity, exposure to particulate matter and oxidative stress

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Purpose: Following the Covid-19 pandemic, more and more people choose to train outdoors to avoid contagion but not only infectious diseases cause serious damage to health. Air pollution is the first environmental risk factor for mortality and fifth largest risk factor for all causes of death (Cohen, 2017). Oxidative stress (OS) appears to play a key role in the cardiovascular effects of many air pollutants (Kelly & Fussell, 2017; Miller, 2021). The practice of regular physical activity is strongly encouraged to achieve a healthy lifestyle. However, particularly during a physical exercise session, the volume of inhaled pollutants increases. The aim of this review is to evaluate the association between air pollution and biomarkers of oxidative stress on the basis of existing studies, trying to understand if it would be safer to stay physically inactive or if physical activity is able to create adaptations capable of counteracting the harmful effects of air pollution.

Methods: Based on PRISMA guidelines, it was performed a literature review on Web of Science and PubMed databases to summarize studies reporting the association between exposure to particulate matter (PM₁₀, PM_{2,5}) and biomarkers of oxidative stress. Subsequently, the physical activity variable was added to the search string. A total of 103 studies were selected for full text assessment, 21 met inclusion and exclusion criteria of research.

Results: Despite some contradictions, the current literature suggests that physical exercise in a polluted environment contributes to increasing OS but on the other hand it determines a greater resistance of tissues to morphological damage thanks to the antioxidant system upregulation. The effect changes according to the level of pollution, the time of exposure and the intensity of physical exercise. Vigorous physical activity is a protective factor for both high and low PM levels.

Conclusion: Although most of the published data supports a beneficial effect of physical exercise even at higher pollution levels, it is necessary for those who train outdoors to evaluate the external environmental conditions. The single person can only partially protect his health, local governments should provide information on the places, time slots and days on which activities are recommended. The change should be aimed at improving air quality by implementing stricter legislative guidelines on air pollution thresholds.

