Wildland Fires in the Brazilian Amazon: The Impact of Fire Outbreaks in wildland firefighters' Health – Preliminary Findings Based on Physiological Biomarkers

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INTRODUCTION Department of Environmental Health, School of Public Health, University of São Paulo, São Paulo, Brazil: Climate change has contributed to the increasing frequency of wildland fires in the Brazilian Amazon. Wildland firefighters are the major combatants of wildfires, and consequently the most exposed people for the wildfire's dangers, including extreme environmental conditions, smoke inhalation, and physical overload, which may impair various physiological systems. OBJECTIVE: Comparison of physiological biomarkers in wildland firefighters exposed to varying wildfire levels across different Amazonian regions, including indigenous and riverside communities. MATERIALS AND METHODS: A total of 109 biological samples were analyzed from wildland firefighters who responded to level 2 wildfires in Altamira (ALT; n=32), Novo Progresso (NP; n=21), and the Tapajós-Arapiuns Extractive Reserve (TAER; n=23), as well as level 3 wildfires in Porto de Moz (PM; n=23). The analyses included salivary cortisol, complete blood count, lipid profile, glycated hemoglobin, and C-reactive protein (CRP). Dehydration levels were assessed using hematocrit and hemoglobin values. The remaining biochemical parameters were normalized based on hematocrit values. Statistical analyses were performed using Stata software, including the Mann-Whitney test and quantile regression to assess differences between fire levels, along with prevalence analysis of cardiovascular risk. RESULTS AND CONCLUSION: When compared the wildfire by municipality, the firefighters in ALT showed signs of dehydration (p = 0.0001). In NP, the highest levels of CRP were found, indicating systemic inflammation. The TAER presented the highest values of glycated hemoglobin, red blood cells, eosinophils, platelets, total cholesterol, and High Density Lipoprotein (p < 0.05). In PM, higher cortisol levels were observed (p = 0.0012), suggesting greater physiological stress. Firefighters exposed to level 3 wildfires had significantly higher cortisol levels than those exposed to level 2 (p = 0.0001). Additionally, regression analysis indicated that wildland firefighters involved in level 3 wildfires had higher cortisol levels than those in level 2. The cardiovascular risk assessment revealed high prevalence rates among firefighters operating in TAER (95.7%) and NP (95.2%). These findings reinforce the importance of monitoring the health of wildland firefighters, considering the extreme environmental conditions and occupational risks associated with wildfire suppression. This represents the first national biomonitoring data on firefighters operating in the Amazon region.

Keywords: Occupational exposure, firefighters, wildfires, Amazon.