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SELF-REPORTED MODERATE-HIGH INTENSITY PHYSICAL ACTIVITY DOES NOT REDUCE INFLAMMATORY MARKERS IN OVERWEIGHT/OBESE INDIVIDUALS

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KEYWORDS: obesity, inflammation, IL-17, IL-23, IL-12

PURPOSE

Obesity-associated systemic inflammation is a major cause of type 2 diabetes, various cardiovascular diseases (CVD), and increased mortality rates. Overweight and obese individuals who are physically active (“fat but fit”), appear to have a similar risk of CVD as do normal weight individuals who are inactive. Physical activity, therefore, is a key mechanism through which metabolic inflammation is reduced. The purpose of this study was to examine the effects of physical activity on circulating inflammatory mediators of cardiovascular disease (IL-17, IL-12, IL-23, IFN- γ , L-selectin) in “fit” vs. sedentary overweight/obese individuals.

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METHODS

Thirty-one overweight or obese (BMI 34.2 ± 5.1 kg $\times$ m⁻², % fat 40.6 ± 6.7), male and female volunteers aged 35-55 years (44.5 ± 4.8 yrs, 39% males) were categorized into one of two groups based on a validated physical activity questionnaire: sedentary (SED, N= 17, 27 ± 6 mL O₂ $\times$ kg⁻¹ $\times$ min⁻¹) or physically active (PA, N=14, 30 ± 6 mL O₂ $\times$ kg⁻¹ $\times$ min⁻¹). PA participated in ≥ 180 minutes of moderate-high intensity exercise per week for a minimum of 4 months, including aerobic training, resistance training, or a combination of both. SED participated

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in structured physical activity ≤ 1 hour per week. Preliminary testing consisted of anthropometric measurements (height, weight, waist to hip ratio), and body composition using dual energy x-ray absorptiometry (DEXA). Maximal oxygen consumption was assessed on a treadmill using the ParvoMed Metabolic measurement system (Sandy, UT). Blood samples were obtained in the fasted (at least 10 hr) state, after subjects refrained from exercise for 36 hours. Plasma or serum samples were analyzed using an enzyme-linked immunosorbent assay (ELISA) kit (Interleukin-17 (IL-17)), interferon-gamma (IFN-g) (Invitrogen, Carlsbad, CA) or milliplex assay (interleukins 12, 23 (IL-12, IL-23) and L-selectin; EMD Millipore, Billerica, MA) using manufacturer instructions. Hemoglobin A1c was assessed by LabCorp (Fort Worth, TX).

RESULTS

HbA1c (%) was significantly lower in physically active (PA) individuals when compared to the sedentary group (5.5 ± 0.1 vs. $5.8 \pm 0.1\%$, respectively; $p=0.031$). There were no differences between the groups (PA vs. SED) in any of the inflammatory markers measured ($p>0.05$). IL-12 was significantly correlated with IL-17 ($r=0.647$, $p<0.0001$), IL-23 ($r=0.493$, $p=0.005$), and L-selectin ($r=0.564$ $p=0.001$). Similarly, IL-17 was positively correlated with L-selectin ($r=0.410$, $p=0.022$).

CONCLUSION

While moderate-intense PA lowered HbA1C %, indicating better carbohydrate metabolism, the *ad libitum* exercise dosage of the “fit” group was not sufficient to successfully decrease low-grade systemic inflammation as measured by the markers here. Further study of well-controlled exercise dose will be necessary to define the minimum exercise dose required to confer tangible health benefits as well as maximize overall health outcomes.