



## The Associations of Total Physical Activity Intensity and Insulin Resistance Syndromes in Obese Adults

**Fatema Al-Rashed**

*Immunology & Microbiology Department, Kuwait*

### Abstract:

**Background:** The association between obesity and insulin resistance syndromes (IRS) has long been established (1-2). Nevertheless, limited data regarding the effect of physical activity (PA) intensity and its ability to modulate IRS. We aim to determine whether obese individuals would benefit more from engaging in light activity throughout the day compared to single bout of acute exercise of moderate or vigorous activity for a shorter period per day

**Methods:** A total of 60 obese participants with a BMI  $\geq$  30 (30 males and 30 females) were enrolled for this study. Activity levels were measured through an accelerometer worn except when bathing for seven consecutive days. Habitual activities were self-reported, and fasting glucose, insulin, and lipid profile were measured. Monocytic inflammatory markers expression was analyzed by flow cytometry analysis and cytokines secretion was investigated by ELISA. Multiple regressions controlling for significant variables in univariate regression were performed to evaluate the association between the actigraphy-assessed activity measures, inflammatory cytokines, and insulin resistance.

**Results:** The percentage of total individual activity showed a significant negative correlation to lower lipid profile, HOMA-IR and monocytes inflammatory production. A higher daily percentage of moderate to vigorous physical activities was significantly negatively correlated with body fat percentage, yet, only high volume of total activity and total light activity throughout the day seemed beneficial for better insulin sensitivity (light %  $P=0.0042$ ,  $r=-0.377$ ; moderate %  $P=0.962$ ,  $r=0.064$ ; vigorous %  $P=0.923$ ,  $r=0.013$ ). Total physical activity had positive correlation to



monocytic expression of M2 marker regardless of physical intensity. Yet, only higher volume of light activity was found negatively correlated to the surface expression of nonclassical monocyte expression (CD14dim CD16<sup>++</sup>;  $P=0.01$ ,  $r=-0.48$ ). In a similar manner all intensities of physical activities were shown to associate negatively with TNF- $\alpha$  secretion. Yet, only IL-17A and MCP-1 were found significantly negatively associated with higher volume of lighter activity through the day.

**Conclusions:** Maintaining general light movements throughout the day can be beneficial when compared to a short period of stringent workout. This provides a better understanding of how to implement effective approaches to lifestyle change in preventing IRS and T2D.

### Publication of speakers:

1. Faeh, D., et al., Obesity but not overweight is associated with increased mortality risk. *Eur J Epidemiol*, 2011. 26(8): p. 647-55.
2. Nguyen, N.T., et al., Association of hypertension, diabetes, dyslipidemia, and metabolic syndrome with obesity: findings from the National Health and Nutrition Examination Survey, 1999 to 2004. *J Am Coll Surg*, 2008. 207(6): p. 928-34.

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