Research Experiences for Teachers and Young Scholars in Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)

csats Center for Science and the Schools

Cortisol in Relation to Environment

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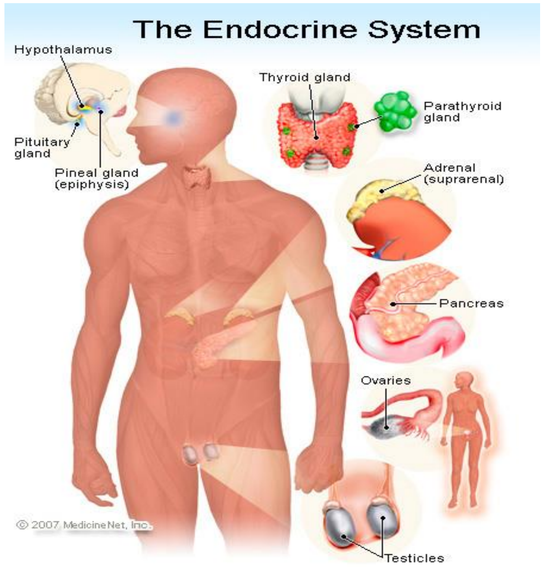
Background

Cortisol is a hormone that controls the body's use of energy (glucose). This process is known as gluconeogenesis[1]. Two things that affect cortisol the most are distress, and exposure to foreign objects.[2] For immigrant farmworkers, this may be translated as being exposed to pesticides and distress associated with their social and work environment.

1. Ramnanan, C.J., Effects of 11ß-hydroxysteroid dehydrogenase-1 inhibition on hepatic glycogenolysis and gluconeogenesis, American Journal of Physiology, 2012.

2. Annie Hogh, Exposure to negative acts at work, psychological stress reactions and physiological stress response, Journal of Psychosomatic Research, Volume 73, Issue 1, July 2012.



Objective

The overall goal of this study is to evaluate the relationship between environmental stress (pesticide exposure) and cortisol for Mexican immigrant farmworkers . We also evaluate the relationship between psychological stress and cortisol.

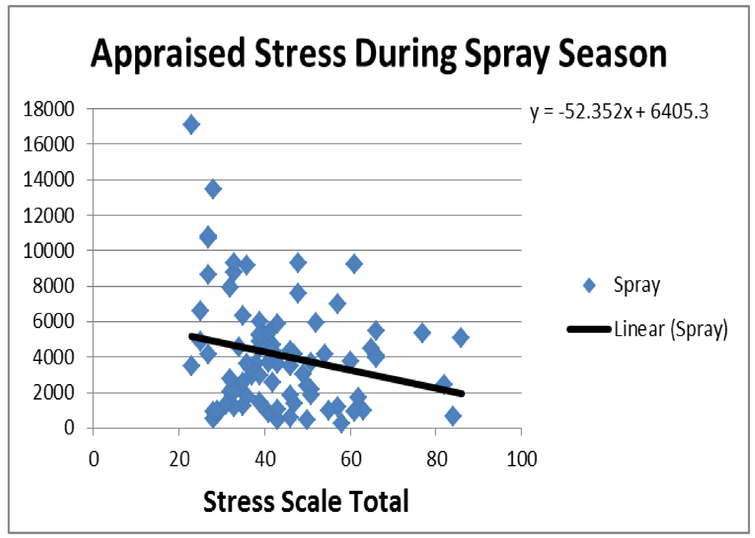
Methods

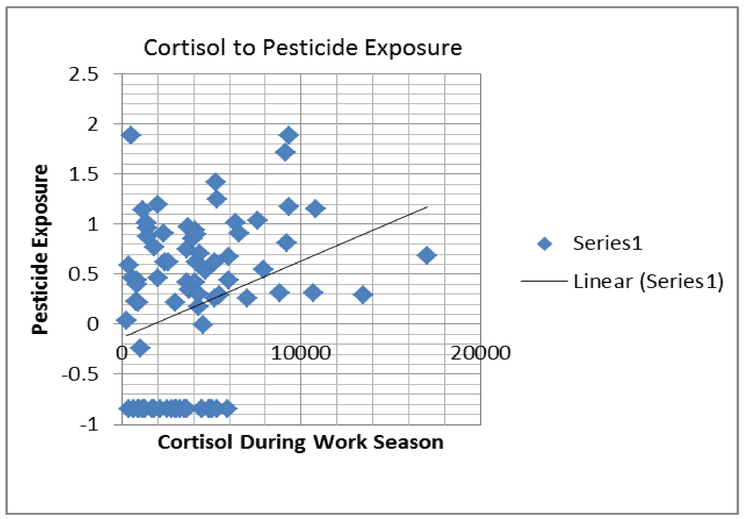
One hundred migrant farmworkers in Washington State is the test group.

- Each day they provided salivary samples for measuring cortisol.
- A 23 item stress-scale survey was also taken by the farmworkers to determine appraised stress during the working and non-working season. For example:
  - Have you felt stressed because of lack of enough work?
  - Have you felt stressed because of injustice at work?
- The data was analyzed by running correlations between cortisol and 6 pesticide metabolites, and between cortisol and appraised stress. A log transformation of the pesticide metabolites was performed to correct for normality.

Results

- Pesticide Metabolites: Non-statistically significant correlations were found for spdedtp1, spdetp1, spmdtp1, spdmp1, spdmtp1 ($p>.05$ for all). However, metabolite spdep1 is statistically significantly correlated ($r=.296$, $p<.05$).
- Stress Scale: A statistically significant correlation was found between appraised stress and cortisol during the working season ($r=-.23$, $p<.05$). A non-statistically significant correlation was found during the non-working season between appraised stress and cortisol ($r=-.04$, $p>.05$).





Discussion

The results showed that as stress increased during the work season, cortisol decreased. Also, no significant correlation was found between pesticides and cortisol for all but one metabolite. Spdep1 showed an increase in cortisol with exposure. The ASSIST project could provide a tool to take multiple measures of cortisol levels across time and compare these to social-environmental stressors. This could provide a more accurate assessment of the environmental and perceived impacts on cortisol and health among immigrant farmworkers.

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