Association Between Fasting Insulin and High-Sensitivity C-Reactive Protein Among Adults: NHANES 2005-2010

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BACKGROUND

Hyperglycemia is associated with chronic low-grade inflammation[1] and is the focus of many screening and treatment recommendations.

Insulin may also be associated with inflammation. [2,3]

Independent effects of insulin are difficult to ascertain in a population with diabetes due to confounding from hyperglycemia, beta cell failure and medications

OBJECTIVES

Examine the association between fasting insulin and high-sensitivity C-reactive protein (hs-CRP), a biomarker for inflammation using data from the National Health and Nutrition Examination Survey (NHANES) between the years 2005-2010.

METHODS

To identify independent effects of fasting insulin, a non-diabetic population was selected from NHANES 2005-2010.

Exclusion criteria:
- Current pregnancy
- Use of glucose-lowering medications
- Use of cholesterol-lowering medications
- Age less than 20 years

Final sample included 4,884 participants

Generalized linear models with Gamma distribution and identity link function were conducted to estimate associations after adjusting for potential confounding covariates, sampling weights and complex sampling design.

METHODS (cont.)

Covariates included in the model:
- Age
- Race
- Gender
- Physical activity
- Smoking status
- Waist circumference
- Poverty-income ratio

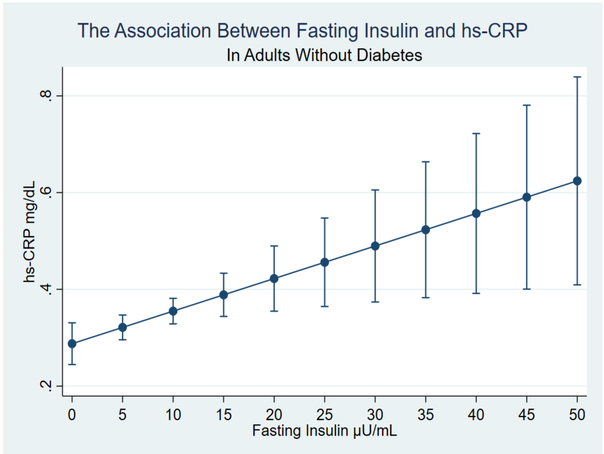
RESULTS

Table 1: Demographics and Summary Statistics (n=4,884)

Mean age in years, mean (SD)	46 (17)
Male, n (%)	2435 (49.86)
White, n (%)	2398 (49.1)
Black, n (%)	924 (18.9)
Hispanic, n (%)	1317 (27.0)
Other, n (%)	245 (5.0)
Non-smoker, n (%)	3731 (76.39)
Current smoker, n (%)	1153 (23.61)
Poverty-income ratio (family income/poverty), mean (SD)	2.56 (1.62)
Self-reported moderate or vigorous physical activity, n (%)	3429 (70.21)
Waist circumference (cm), mean (SE)	96.70 (15.39)
Fasting insulin (μU/mL) mean (SD)	12.57 (11.66)
hs-CRP (mg/dL), mean (SD)	.417 (.81)

RESULTS (cont.)

Figure 1



PRELIMINARY CONCLUSIONS

There is an independent association between fasting insulin and hs-CRP. This independent association was maintained while controlling for waist circumference.

These results suggest that further studies are warranted to examine the cause-and-effect relationship between insulin and inflammation and whether this relationship is fully or partially mediated by waist circumference. If future studies confirm a causal association, treatment recommendations will need to be modified; current treatment recommendations have a singular focus on glycemic goals, and may need to be expanded to include insulin.

Decreasing glucose load, for example by implementing a low-carbohydrate diet, may be a better treatment approach than increasing insulin levels with medication.

STUDY LIMITATIONS

A cause-and effect relationship cannot be determined from cross-sectional data.

NEXT STEPS

Additional research is needed to examine the cause-and-effect relationship between insulin and inflammation

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