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May 3rd, 8:00 AM

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Chen, Xinhua MD; Stein, Thomas P. PhD; Scholl, Theresa O. PhD; and Steer, Robert A. EdD, "Associations of Maternal Plasma Free Fatty Acid Profiles with Markers of Inflammation in Healthy Pregnant Women" (2018). *Stratford Campus Research Day*. 13.
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ROWAN UNIVERSITY
School of Osteopathic Medicine

Associations of Maternal Plasma Free Fatty Acid Profiles with Markers of Inflammation in Healthy Pregnant Women

Xinhua Chen, Thomas P. Stein, Theresa O. Scholl, Robert A. Steer

Introduction

- Inflammatory response changes during normal pregnancy in parallel with an increased level of circulating free fatty acids (FFAs).
- Data in non-pregnancy studies suggested that chronic inflammation plays an important role in many of the chronic diseases, and certain FFAs are involved in inflammation and its resolution.
- Data in healthy pregnant women between the relationship of FFAs composition with markers of inflammation have not been extensively examined.

Objective

We investigated the relationship between maternal fasting plasma free fatty acids (FFAs) composition and markers of inflammation (MOI) (IL-6, 8, 10, TNF-α, granulocyte macrophage colony-stimulating factor (GMCSF) and resistin) in healthy pregnant women during early gestation (week 16).

Design and Methods

- A prospective observational cohort study of pregnancy outcome and complications in young, generally health women residing in Camden, NJ (n=1,562). Women who developed gestational diabetes during late gestation were excluded to the analysis.
- Blood samples collected at entry to prenatal care (16 weeks) were analyzed.
- Serum markers of inflammation (IL-6, 8, 10, TNF-α, GMCSF, resistin) were measured by multiplex kits (Magpix) using the Luminex xMap Technology.

FFAs identified by GCMS

FFAs name	FFAs abbreviation
Myristic Acid	MA
Palmitic Acid	PA
Palmitoleic Acid	PO
Oleic acid	OA
Stearic Acid	SA
Linoleic Acid	LA
α-Linolenic Acid	ALA
Dihomo-γ-linolenic acid	DGLA
Arachidonic acid	AA
Eicosapentaenoic acid	EPA
Docosahexaenoic acid	DHA

Statistical analysis

Log transformation was used for calculation of means and SEM for skewed distributions of MOI measurements.

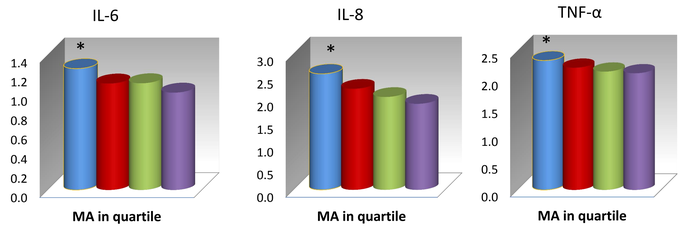
ANOVA and multiple regression analysis were performed to evaluate the relationship between MOI (dependent variable) and individual FFA (expressed as percentage of total FFAs, independent variable).

Potential confounding variables including maternal age, pre-pregnant BMI, ethnicity, parity, cigarette smoking were controlled in multivariable models.

Characteristics of participants (n=1,562)

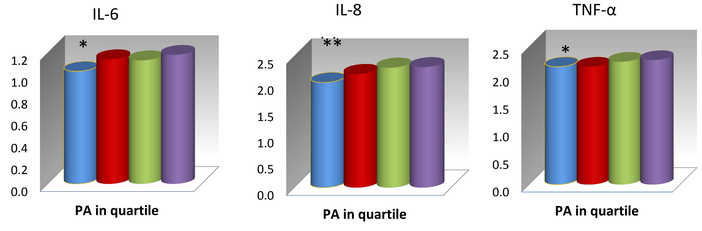
Characteristic	Mean ± SD or n (%)
Age (yr.)	21.88 ± 5.17
Pre-pregnant BMI (kg/m^2)	25.55 ± 6.14
Obesity (BMI ≥30) n (%)	303 (19.39)
Nulliparous n (%)	602 (38.54)
Ethnicity n (%)	
Hispanic	767 (49.10)
African American	573 (36.68)
Caucasian & other	222 (14.21)
Cigarette smoking n (%)	291 (18.63)
Medicaid n (%)	1548 (99.10)

Negative relationship between myristic acid and markers of inflammation



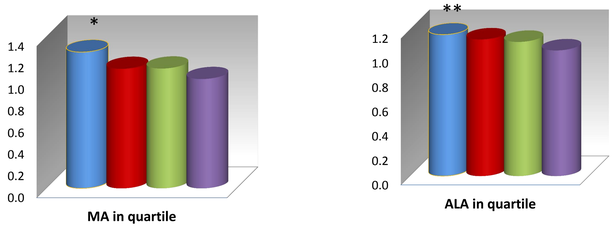
* P for trend <0.0001 for each

Positive relationship between palmitic acid and markers of inflammation



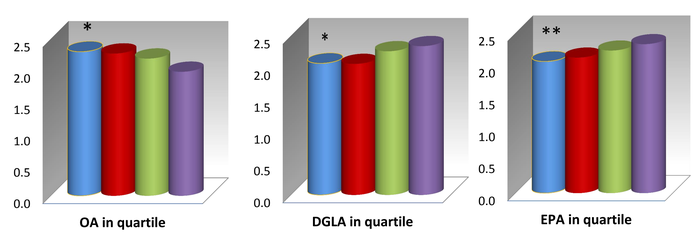
* P for trend <0.01, ** P for trend <0.0001

Relationship of selected FFA and IL-6



* P for trend <0.0001 ** P for trend <0.01

Relationship of selected FFA and IL-8



* P for trend <0.0001, ** p for trend <0.001

Summary

In normal pregnant women during early gestation, plasma saturated FFA (palmitic acid) and polyunsaturated long-chain FFAs (DGLA, arachidonic acid and EPA) (expressed as percentage of total FFA) were significantly positively associated with IL6, 8, TNF-α and resistin.

In contrast, plasma palmitoleic acid, oleic acid, linolenic acid and myristic acid were inversely associated with IL6, 8, TNF-α and resistin.

Conclusions

These data suggested that maternal functional long-chain FFAs influence inflammatory response during normal pregnancy. Changing in specific FFA composition by modification of dietary intake of FAs may reduce low-grade inflammation and inflammation related poor pregnancy complications.

Acknowledgement

This research was supported by NIMHD grant 5R01MD007828.