



## Nitric oxide, inflammation, lipid profile, and cortisol in normal and overweight women with fibromyalgia

SCIENCE

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Key Take-Away:

- C-reactive protein (CRP) and apolipoprotein B biomarkers level were higher in normal weight woman diagnosed with fibromyalgia (FM) in comparison to overweight patients. The increased levels of CRP and apolipoprotein B may create a greater risk of cardiovascular diseases to the women diagnosed with FM.
- The serum levels of other biomarkers like NO, cytokines and cortisol were not altered in this cohort of patients with FM compared to the controls.

Fibromyalgia (FM) is a syndrome that produces musculoskeletal pain and functional disability. FM is related to a higher prevalence of overweight and obesity than in the general population. The etiology of FM is not clear.

ABSTRACT:

Background:

Fibromyalgia (FM) is a syndrome that produces musculoskeletal pain and functional disability. FM is related to a higher prevalence of overweight and obesity than in the general population. The etiology of FM is not clear. Research has identified several conditions associated with this syndrome including oxidative stress, microcirculation abnormalities, inflammation, alterations in lipid profile and neuroendocrine disturbances which may lead to altered levels of nitric oxide (NO), cytokines, lipids, and cortisol.

NO is a key molecule because it is implicated in pain pathways and in regulating inflammation, lipidaemia and hypothalamic-pituitary-adrenal (HPA) axis. Researchers reported conflicting results regarding NO levels in FM patients. Inflammation is characterized by interplay between pro- and anti-inflammatory cytokines. Although researchers have observed a dysregulation of the inflammatory response in FM, they have reported conflicting results regarding inflammatory markers level in these patients. Studies have also identified associations between cytokines such as TNF- $\alpha$  and IL-1, -6, and -8 and symptoms such as fatigue, pain, and stress response.

### Rationale behind research

- i. Several studies have identified many factors associated with FM but findings have not been conclusive.
- ii. This study was conducted to address the huge area of unmet need i.e. to draw some consistent results related to factors associated with FM

### • Objective

To investigate changes in serum levels of factors associated with FM, including NO, inflammatory markers, lipid profile and cortisol, in women with FM and healthy controls to identify a pattern of differentially expresses markers.

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Methods:





**NOTE:** This was a correlational, cross-sectional, case control study which was performed on serum samples of women with FM and age matched controls, grouped according to their BMI: 12 normal-weight patients and 12 controls, and 13 overweight patients and 8 controls.

### Study outcomes

- NO levels: Ozone based chemiluminescence assay was used to measure NO
- Inflammatory mediators and cortisol levels: Determined by immunoassay
- Lipid profile: Measured using spectrophotometric procedure
- Functional capacity: Assessed by fibromyalgia impact questionnaire

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Results:



#### • Outcomes:

- NO levels: There was no significant differences in serum NOx levels between FM patients and healthy volunteers
- Inflammatory mediators and cortisol: Serum levels of pro inflammatory cytokine IL-6 and anti-inflammatory cytokine IL-10 remain unaltered in patients vs controls. C-reactive protein (CRP) was higher in normal and overweight women with FM than normal and overweight controls. There was no difference in cortisol between FM women and controls



- Lipid profile: Apolipoprotein B levels ( $p < .05$ ) were higher in normal weight women with FM than healthy women. High levels of triglycerides ( $p < .05$ ) and apolipoprotein B ( $p < .05$ ) were detected in overweight patients compared to overweight controls.



- Functional capacity: Negative association between NO level and functional capacity was observed as determined by FIQ (Pearson correlation coefficient,  $r = -0.921$ ) in normal weight patients. The FIQ score correlated positively with apolipoprotein B ( $r = 0.762$ ;  $p < .05$ ) in overweight women with FM. Regression analysis showed interactions of BMI with CRP and triglycerides in women diagnosed with FM.
- CRP ( $p < .01$ ), apolipoprotein B ( $p < .05$ ) and triglycerides ( $p < .05$ ) were higher in normal weight women (group 1) diagnosed with FM in comparison to overweight patients (group 3).



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Conclusion:

Result indicates that regulation of CRP and apolipoprotein B may be associated with FM-related dysfunction in both normal and overweight women with FM as reflected by increased serum levels and



their correlation with FM clinical parameters. So, women with FM may be at increased risk of cardiovascular diseases. Serum levels of other markers that prior research had suggested were associated with this syndrome such as NO, cytokines and cortisol was not altered in this cohort of FM patients than controls.

The findings of this study are consistent with the results from other studies which have shown no significant differences in NO between either normal or overweight women with FM or other factors like increased serum CRP in normal and overweight women with FM. These results contribute to the nursing science by providing evidence that may ultimately help to improve the practice guidelines for the care of patients with FM.

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Exploratory, Fibromyalgia, Nerves, Correlational, Cross-Sectional, Case Control Study, C-Reactive Protein (CRP), Apolipoprotein B Biomarkers, Ozone Based Chemiluminescence Assay