Association of C-Reactive Protein and Cardiovascular Disease in Obese Patients

Muneza Esani, PhD, MT(ASCP); Flor Chavez, MSCLS, MLS(ASCP)
Department of Clinical Laboratory Sciences
The University of Texas Medical Branch, Galveston, TX

Abstract

C-reactive protein (CRP) is an acute phase reactant and nonspecific marker of inflammation that is predominantly produced in the liver in response to proinflammatory cytokines, particularly interleukin 6 (IL-6). It has been recognized that approximately 30% of IL-6 originates from adipose tissue and its concentration increases with increasing obesity. This study investigated the association of CRP with cardiovascular disease in obese patients, utilizing National Health and Nutritional Examination Survey (NHANES) data on adults aged ≥40 years of age. Mean CRP levels were significantly higher (p<0.0001) in obese subjects (Body Mass Index (BMI) ≥30 kg/m²) compared to Normal. However, CRP levels were not significantly different (p=0.5575) in patients with self-reported history of cardiovascular disease (CVD) compared to those that did not report CVD. People with CVD were 1.5 times more likely to have increased CRP levels and 1.4 times more likely to be obese which was significant. This study also examined if obesity was a risk factor for high CRP levels using logistic regression and found that Individuals with high CRP levels were more likely to be obese (p=0.0001). The results of this study have important implications for obese individuals with high CRP levels.

Results

- Mean CRP levels for women were significantly higher than that of men (p=0.0001).
- Obese individuals had significantly higher mean CRP levels than those with normal Body Mass Index (p<0.0001).
- Non Hispanic Blacks (p=0.0001) and Mexican Americans (p=0.004) had significantly higher mean CRP levels than Non Hispanic Whites.
- The difference in mean CRP levels among those with and without cardiovascular disease was not significant (p=0.0575).

Logistic Regression Analysis Results for Outcome of Cardiovascular Disease Status.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>1.515*</td>
<td>1.060-2.181</td>
</tr>
<tr>
<td>Obesity</td>
<td>1.379*</td>
<td>1.097-1.734</td>
</tr>
</tbody>
</table>

Note: *Statistically significant, OR: odds ratio, CI: confidence interval.
- Results indicate that people with CVD were 1.5 times more likely to have increased CRP levels and were 1.4 times more likely to be obese.
- People with high CRP levels were twice as likely to be overweight or obese (OR: 2.083; CI: 1.539 - 2.619) which was significant.

BMI Categories as Predictors for High CRP Levels.

<table>
<thead>
<tr>
<th>Categories</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI: 25 &lt;30 kg/m²</td>
<td>1.192</td>
<td>0.841-1.691</td>
</tr>
<tr>
<td>BMI: 30 &lt;35 kg/m²</td>
<td>1.832*</td>
<td>1.283-2.615</td>
</tr>
<tr>
<td>BMI: 35 &lt;40 kg/m²</td>
<td>3.458*</td>
<td>2.359-5.071</td>
</tr>
<tr>
<td>BMI: ≥40 kg/m²</td>
<td>6.867*</td>
<td>4.677-10.082</td>
</tr>
</tbody>
</table>

* statistically significant, OR is odds ratio, CI is confidence interval, BMI is body mass index.

Conclusions and Discussion

- CRP levels are significantly increased in obese individuals and levels increase with increasing levels of obesity.
- There is no association of increased CRP with overweight status of an individual.
- Increased CRP levels and obesity are independent predictors of cardiovascular disease.
- Reducing obesity could potentially reduce CRP levels, thus decreasing CVD risk. Therefore, incorporation of CRP levels in the cardiovascular disease assessment for obese individuals could help to identify individuals who are at risk of cardiovascular disease.

Methods

This was a retrospective observational cross-sectional population based study that utilized National Health and Nutritional Examination Survey (NHANES) data from January 1, 2009 to December 31, 2010. Respondents, who were ≥40 years old, had available C-reactive protein results, and had available body mass index results were included in the study.

References