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Impact of Dietary Habits on PTX3 Levels in Japanese Adults

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Description

Pentraxin 3 (PTX3) is an anti-inflammatory protein known for its cardioprotective effects. Previous studies have shown that PTX3 levels increase after weight loss in obese men and following aerobic exercise in non-obese individuals. However, the influence of specific dietary factors on PTX3 levels remains largely unexplored. This cross-sectional study aimed to investigate the relationship between circulating PTX3 levels and dietary intake among Japanese adults.

We hypothesized that high consumption of sugary foods would correlate with lower plasma PTX3 levels, potentially contributing to obesity. The study included 327 participants, who were classified into high and low groups based on their intake of Confectionery and Sugar-Sweetened Beverages (CSSB).

The role of CSSB diet

We found that participants in the high CSSB group had significantly lower PTX3 levels compared to those in the low CSSB group. Biological sex emerged as the most influential factor affecting PTX3 levels, with additional impacts from dietary intake, particularly of Tsukudani (a traditional Japanese preserved food) and CSSB, along with various metabolic syndrome indicators. Notably, the determinants of PTX3 levels varied across different sex and age groups. In women, body mass index, Waist Circumference (WC) and High-Density Lipoprotein Cholesterol (HDL-C) were significantly associated with PTX3 levels. In individuals over 65 years old, PTX3 levels were influenced by Tsukudani intake, HDL-C, heart rate and CSSB consumption.

Cardiovascular disease remains the leading cause of mortality worldwide. Dietary approaches, including the Dietary Approaches to Stop Hypertension (DASH) diet and the traditional Japanese dietary pattern (Washoku), have demonstrated effectiveness in preventing cardiovascular diseases. However, there are currently no efficient tools to assess daily dietary habits for lifestyle disease prevention.

Research indicates that individuals with healthier dietary patterns tend to have lower levels of various inflammatory markers compared to those with unhealthy diets characterized by high sugar intake. PTX3 is recognized as a cardioprotective and anti-inflammatory factor, with previous studies showing lower levels in overweight individuals. Additionally, dramatic weight loss has been linked to increased PTX3 concentrations, suggesting its potential use as an indicator of dietary quality in obese individuals.

In this study, we aimed to examine how specific dietary habits influence circulating PTX3 levels in Japanese adults. A total of 485 adults were evaluated through anthropometric measurements, blood pressure monitoring and biochemical analyses after overnight fasting. A Food Frequency Questionnaire (FFQ) was distributed to assess dietary intake and participants were categorized based on their CSSB consumption.

Following exclusion criteria, 327 participants were analyzed. We categorized individuals into two groups: low CSSB intake and high CSSB intake. Statistical analyses were performed to identify associations between PTX3 levels and various factors, using Least Absolute Shrinkage and Selection Operator (LASSO) analysis to determine significant predictors across different demographic groups.

Among the participants, those consuming high levels of CSSB exhibited lower plasma PTX3 levels. The analysis revealed that sex and specific dietary habits, particularly Tsukudani intake and CSSB consumption, significantly influenced PTX3 levels. Additionally, WC and HDL-C were found to be notable factors in women, while older individuals showed associations with saturated fatty acids and systolic blood pressure.

This study highlights the relationship between dietary intake and circulating PTX3 levels in Japanese adults. Individuals with daily CSSB intake exceeding 200 k_{cal} displayed lower PTX3 concentrations. LASSO analysis identified several significant predictors, including biological sex, dietary habits and physical characteristics like WC and HDL-C.

The impact of age and sex on dietary patterns and PTX3 levels was evident, aligning with previous research that noted variations in dietary habits among different demographics. For instance, older individuals generally consume fewer sweets and meats compared to younger adults. The correlation between PTX3 levels and dietary intake underscores the importance of nutrition in modulating inflammatory responses and cardiovascular risk.

Previous studies have also established a positive relationship between PTX3 levels and HDL-C, with findings indicating that HDL-C can enhance PTX3 production. Our results reinforce this association, showing a significant correlation between higher HDL-C levels and increased PTX3 concentrations, particularly in older participants.

Moreover, our research provides new insights into the influence of specific foods on PTX3 levels, particularly the traditional Japanese food Tsukudani. This connection suggests that high-sugar diets may lead to lower PTX3 levels, emphasizing the need for dietary modifications to improve cardiovascular health.