Case Series

CRP levels are influenced by lifestyle and dietary modifications.

Lavanya

Clinical Dietician, Kauvery Hospital, Heart City, Trichy

1. Abstract

C - reactive protein (CRP), an inflammatory biomarker, is influenced by many factors including socio economic position, genetics and diet. The inverse association between diet and CRP is biologically feasible because micronutrients with antioxidative properties may enable the body to manage the balance between production and accumulation of reactive species that cause oxidative stress. It is primarily produced by the liver in response to inflammation, often in response to the release of inflammatory molecules like interleukin-6 (IL-6). According to a study, high protein diet may cause excessive elevation of C- reactive protein.

Keywords: C- reactive protein, High protein diet, Interleukin-6(IL-6).

2. Introduction

CRP is a systemic acute phase protein produced mainly by the liver in response to circulating inflammatory mediators including Il-6 and interleukin-1with systemic inflammation, injury, infection and malignancy.[8] The poor are at high risk for elevated CRP.[9, 10] Inflammation may be one pathway through which socioeconomic position influences health.[10,11] The impact of socioeconomic position on CRP levels can be influenced by genetics, which accounts for 25–40% of the variation in CRP levels between people,[12] and behaviors such as smoking and diet.[11,14–19] Diets high in dietary fiber and rich in fruits and vegetables are associated with lower CRP levels,[20–23] while consumption of a Western diet, a diet high in fat, sugar, sodium, and refined grains, has been hypothesized to elevate CRP levels.[20,24,25] Although the mechanisms are still unclear, a healthful diet is known to be inversely associated with inflammatory factors.[25]

Citation: Lavanya. CRP levels are influenced by lifestyle and dietary modifications. Kauverian Med J., 2025;2(7):8-14

Academic Editor: Dr. Venkita S. Suresh

ISSN: 2584-1572 (Online)

Interpretation OF CRP levels

- Less than 0.3 mg/dL: Normal (level seen in most healthy adults).
- 0.3 to 1.0 mg/dL: Normal or minor elevation (can be seen in obesity, pregnancy, depression, diabetes, common cold, gingivitis, periodontitis, sedentary lifestyle, cigarette smoking, and genetic polymorphisms).
- to 10.0 mg/dL: Moderate elevation (Systemic inflammation such as RA, SLE, or other autoimmune diseases, malignancies, myocardial infarction, pancreatitis, bronchitis).
- More than 10.0 mg/dL: Marked elevation (Acute bacterial infections, viral infections, systemic vasculitis, major trauma).
- More than 50.0 mg/dL: Severe elevation (Acute bacterial infections).

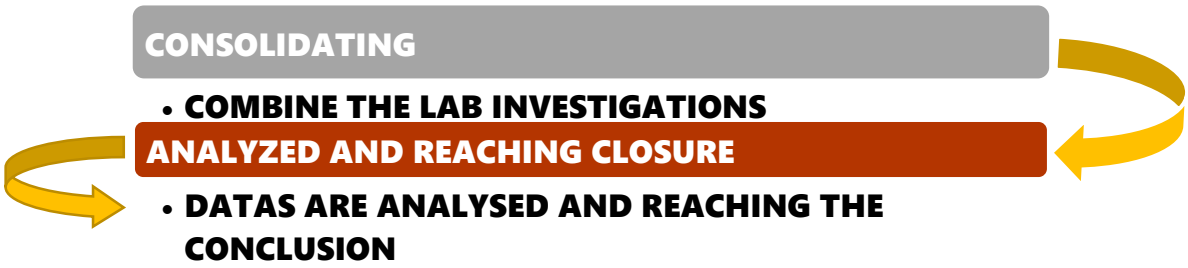
Our referral range is 0 – 6 mg/dl

Physiological Relation Between CRP Levels and Dietary Modification

Accordingly, dietary pattern analysis, which examines the effects of overall diet, has emerged as an alternative and complementary approach. The association between dietary patterns and serum CRP has been explored in several studies,17–22 but the results have been inconsistent.

An association between a healthy, or prudent, dietary pattern (ie, a diet with higher intakes of vegetables, fruit, and fish) and decreased levels of serum CRP has been reported in some studies,[18,20,21] but not in others.[17,19,22] In addition, several studies have demonstrated that a Western, or high fat and processed meat, pattern (ie, higher intakes of red meat, refined grains, processed meat, and high-fat dairy products) is related to elevated serum CRP,17–20 although some studies did not corroborate this finding.[21,22] To our knowledge, there has been only 1 cross-sectional study of dietary patterns and CRP in Japan. In that study, a healthy dietary pattern was strongly associated with lower serum CRP, and a seafood pattern was possibly related to higher CRP.21 The objective of the present study was to evaluate more comprehensively the association between dietary pattern and serum CRP in a Japanese population.

3. Methodology



3.1 Materials and Methods

Assessment was done by using below following criteria's from SGA assessment and current study was done by using laboratory investigations of CRP levels.

- Weight
- Dietary history (Veg or Non- veg)
- Sex
- Age

Period of the study was 3 months (Jan 1 – April 30 – 2025). Total patients count was 35 persons (n = 35).

I.) Within the current investigation, to find the CRP levels of the cardiac patients (n = 35) by using their weight,

S no	BMI ranges	Grade	No of people who have elevated (CRP levels)
1	Below 18.4 kg/m2	Under weight	3
2	18.5-24.9 kg/m2	Normal	7
3	24.91 – 24.99 kg/m2	Borderline overweight	9
4	25-29.9 kg/m2	Overweight	8
5	30- ≥40 kg/m2	Obesity (grade 1,2&3)	8
		Total	35

The above table shows a patient's weight can influence their CRP (C-reactive protein) levels, particularly in the context of obesity and inflammation. Excess body fat, especially abdominal fat, can trigger the liver to produce more CRP, leading to elevated levels.

II.) Within the current investigation, to find the CRP levels of the cardiac patients (n = 35) by using their diet history,

S no	Diet history	No of people have elevated (CRP levels)	CRP levels
1	Veg	1	79.77 mg/dl
2	Non- Veg	32	Above 50mg/dl
3	Ova-Veg	2	7.8 mg/dl 183 mg/dl
	Total	35 members	nil

The table shows 90% of the people are non-vegetarian. Their CRP levels are above 50 mg/dl. But both vegetarian and non-vegetarian dietary patterns can influence C-reactive protein (CRP) levels, but the specific effects can vary depending on the individual and the type of diet.

Generally, vegetarian diets, especially those rich in fruits, vegetables, and fiber, have been linked to lower CRP levels compared to diets high in processed meats and unhealthy fats. However, the impact of specific types of meat, such as red meat, on CRP levels is a complex area with some studies suggesting a positive association, while others show no significant effect.

III.) Within the current investigation, To find the CRP levels of the cardiac patients (n = 35) by using their sex,

S no	Sex	No of people have elevated (CRP levels)	CRP levels
1	Male	20	7 – 201mg/dl
2	Female	15	50 – 292 mg/dl
3	Transgender	0	0
	Total	35 members	nil

The above table shows both can have the nearby same. But female CRP levels are a little bit higher than the male. Compared to males, females' fat composition and hormonal influences are the reasons for this higher elevation. More research is needed to fully understand the mechanisms underlying these gender differences and their potential impact on health outcomes.

V.) Within the current investigation, To find the CRP levels of the cardiac patients (n = 35) by using their age,

S no	Age	No of people have elevated (CRP levels)
1	18 – 24 years	0
2	25 – 34 years	3
3	35 – 44 years	0
	45 – 54 years	10
5	55 – 64 years	9
	65 – 74 years	5
	75 – 84 years	5
	Above 85 years	4

The table above illustrates that persons over the age of 45 have some variability in their CRP levels. According to additional study, aging can influence CRP (C-reactive protein) levels. CRP levels tend to rise with aging, particularly in older persons. Men and women over the age of 45 are more likely to see this increase. CRP levels can fluctuate, although they usually remain steady over time.

Dietary modifications to low the CRP levels

Anti-inflammatory foods are plays a major role to reduce the CRP level. Several nutraceuticals possess anti-inflammatory properties,

- Curcumin – Turmeric
- Omega 3 fatty acids – fishes
- Resveratrol – Grapes
- Gingerol – ginger
- Poly phenol – Green tea extract
- Vitamin D – Sun light
- Vitamin C – citrus fruits
- Bromelain – Pineapple

These compounds can help modulate inflammatory signaling pathways and reduce the levels of pro-inflammatory mediators.

Foods to Be Avoided

- Fatty foods
- Processed foods
- Alcohol consumption
- Salty foods
- High Starchy foods

Nutritional Requirements

Day	Types of therapeutic diet	Energy	Protein	Fat
1	Clear Liquid Diet	800 Kcal	-	-
2	Normal Liquid Diet	1450 Kcal	0.7g / Kg	0.2g /Kg
3	Semisolid Diet	1750 Kcal	1g /Kg	0.4g/Kg
4	Soft Diet	2000 Kcal	1.3g /Kg	0.6g/Kg

Note – Fluid recommendation is depending upon the condition.

(E.g. Acute Pulmonary edema, Severe LV dysfunction – 1.2 L)

4. Conclusion

According to this study, poor diet and sedentary lifestyle with higher BMI & gender have shown higher levels of CRP. Regulation of healthy lifestyle and dietary content, such as antioxidant and anti-inflammatory diets, may protect persons from elevated CRP levels and indirectly against the development of cardiovascular disease and other inflammation-related chronic health conditions. In this regard, registered dietitians and public health nutritionists can provide people with relevant advice.

5. Reference

[1] Devaraj S, Singh U, Jialal I. The evolving role of C-reactive protein in atherothrombosis. Clin Chem. 2009;55(2):229–238. doi: 10.1373/clinchem.2008.108886. [DOI] [PMC free article] [PubMed] [Google Scholar]

[2] Alley DE, Seeman TE, Ki Kim J, Karlamangla A, Hu P, Crimmins EM. Socioeconomic status and C-reactive protein levels in the US population: NHANES IV. Brain Behav Immun. 2006;20(5):498–504. doi: 10.1016/j.bbi.2005.10.003. [DOI] [PubMed] [Google Scholar]

[3] Nazmi A, Victora CG. Socioeconomic and racial/ethnic differentials of C-reactive protein levels: a systemic review of population-based studies. BMC Public Health. 2007;7:212–224. doi: 10.1186/1471-2458-7-212. [DOI] [PMC free article] [PubMed] [Google Scholar]

[4] Deverts DJ, Cohen S, Kalra P, Matthews KA. The prospective association of socioeconomic status with C-reactive protein levels in the CARDIA study. Brain Behav Immun. 2012;26(7):1128–1135. doi: 10.1016/j.bbi.2012.07.017. [DOI] [PMC free article] [PubMed] [Google Scholar]

[5] Rietzchel E, De Buyzere M. High-sensitive C-reactive protein: universal prognostic and causative biomarker in heart disease? Biomark Med. 2012;6(1):19–34. doi: 10.2217/bmm.11.108. [DOI] [PubMed] [Google Scholar]

[6] Neuhouser ML, Schwarz Y, Wang C, et al. A low-glycemic load diet reduces serum C-reactive protein and modestly increases adiponectin in overweight and obese adults. J Nutr. 2012;142(2):369–374. doi: 10.3945/jn.111.149807. [DOI] [PMC free article] [PubMed] [Google Scholar]

[7] McDade TW, Rutherford JN, Adair L, Kuzawa C. Population differences in associations between C-reactive protein concentration and adiposity: comparison of young adults in the Philippines and the United States. Am J Clin Nutr. 2009;89(4):1237–1245. doi: 10.3945/ajcn.2008.27080. [DOI] [PMC free article] [PubMed] [Google Scholar]

[8] Paalani M, Lee JW, Haddad E, Tonstad S. Determinants of inflammatory markers in a bi-ethnic population. Ethn Dis. 2011;21(2):142–149. [PMC free article] [PubMed] [Google Scholar]

[9] Galland L. Diet and inflammation. Nutr Clin Pract. 2010;25(6):634–640. doi: 10.1177/0884533610385703. [DOI] [PubMed] [Google Scholar]

[10] St-Onge MP, Zhang S, Darnell B, Allison DB. Baseline serum C-reactive protein is associated with lipid responses to low-fat and high-polyunsaturated fat diets. J Nutr. 2009;139(4):680–683. doi: 10.3945/jn.108.098251. [DOI] [PMC free article] [PubMed] [Google Scholar]

[11] Aiello AE, Kaplan GA. Socioeconomic position and inflammatory and immune biomarkers of cardiovascular disease: applications to the Panel Study of Income Dynamics. Biodemography Soc Biol. 2009;55(2):178–205. doi: 10.1080/19485560903382304. [DOI] [PMC free article] [PubMed] [Google Scholar]

[12] Nanri A, Yoshida D, Yamaji T, Mizoue T, Takayanagi R, Kono S. Dietary patterns and C-reactive protein in Japanese men and women. Am J Clin Nutr. 2008;87(5):1488–1496. doi: 10.1093/ajcn/87.5.1488. [DOI] [PubMed] [Google Scholar]

[13] Lopez-Garcia E, Schulze MB, Fung TT, et al. Major dietary patterns are related to plasma concentrations of markers of inflammation and endothelial dysfunction. Am J Clin Nutr. 2004;80(4):1029–1035. doi: 10.1093/ajcn/80.4.1029. [DOI] [PubMed] [Google Scholar]

[14] de Mello VDF, Schwab U, Kolehmainen M, et al. A diet high in fatty fish, bilberries and wholegrain products improves markers of endothelial function and inflammation in individuals with impaired glucose metabolism in a randomised controlled trail: the Sysdimet study. Diabetologia. 2011;54(11):2755–2767. doi: 10.1007/s00125-011-2285-3. [DOI] [PubMed] [Google Scholar]

[15] Hlebowicz J, Persson M, Gullberg B, et al. Food patterns, inflammation markers and incidence of cardiovascular disease: the Malmö Diet and Cancer study. J Internal Med. 2011;270(4):365–376. doi: 10.1111/j.1365-2796.2011.02382.x. [DOI] [PubMed] [Google Scholar]

[16] Ma Y, Griffith JA, Chasan-Taber L, et al. Association between dietary fiber and C-reactive protein. Am J Clin Nutr. 2006;83(4):760–766. doi: 10.1093/ajcn/83.4.760. [DOI] [PMC free article] [PubMed] [Google Scholar]

[17] Ekmekcioglu C. Are proinflammatory cytokines involved in an increased risk for depression by unhealthy diets? Medical Hypotheses. 2012;78(2):337–340. doi: 10.1016/j.mehy.2011.11.015. [DOI] [PubMed] [Google Scholar]

[18] Cavicchia PP, Steck SE, Hurley TG, et al. A new dietary inflammatory index predicts interval changes in serum high-sensitivity C-reactive protein. J Nutr. 2009;139(12):2365–2372. doi: 10.3945/jn.109.114025. [DOI] [PMC free article] [PubMed] [Google Scholar]