RELATIONSHIP BETWEEN hs-CRP AND CARDIAC EFFICIENCY IN CHRONIC ALCOHOLICS

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ABSTRACT

High sensitive C-reactive protein (hs-CRP), a non-specific marker of inflammatory status has considerable interest focused due to its ability to predict myocardial infarction, stroke, peripheral arterial disease and sudden cardiac death. Alcoholics are known to be associated with inflammation of heart. This study was taken up to look for an association between consumption of alcoholic beverages over 10 years and serum concentration of hs-CRP. 3 groups were studied, 30 age matched control, 30 non-drinkers with cardio vascular complications and 30 alcoholics with history of cardio-vascular disease. Blood was analyzed for hs-CRP. Results indicated that the level of hs-CRP was 0.17 ± 0.16 mg/lit in group 1; 0.79 ± 0.41 mg/lit in group 2 and 1.67 ± 0.16 mg/lit in group 3. A correlation was also obtained between the hs-CRP levels and cardiac efficiency in chronic alcoholics. The elevated hs-CRP levels in chronic alcoholic with heart disease could probably be due to enhanced damaging effect of alcohol on the heart and other organs.

KEY WORDS

High Sensitive C-reactive protein, Alcohol Inflammation, Cardio-vascular disease.

INTRODUCTION

C-reactive protein (CRP) analysis, is a test which measures the concentration in blood serum of a special type of protein produced in the liver that is present during episodes of acute inflammation or infection. Recently, new studies have suggested that CRP may also be elevated in heart attacks (1). Many consider elevated CRP to be a positive risk factor for coronary artery disease (2).

Many studies suggested that after adjusting for other prognostic factors, hs-CRP was still useful as a risk predictor for recurrent cardiovascular disease, unstable angina and acute myocardial infarction (3). Higher hs-CRP levels also are associated with lower survival rate of these people. Furthermore, population-based studies have shown

that markers of inflammation such as hs-CRP predict future cardiovascular disease risks (4, 5).

Chronic alcoholics are known to be associated with inflammation of organs like heart, liver and pancreas. hs-CRP level estimation could thus give us an idea of the exact inflammatory state in the alcoholics (6).

We hypothesized that the hs-CRP levels could be elevated in the subjects consuming alcoholic beverages for more than 10 years in comparison to non-drinkers. The main objectives of the study were to estimate hs-CRP in normal subjects, to estimate hs-CRP in non-drinkers with cardiovascular dysfunction, to estimate hs-CRP values chronic alcoholics with cardiovascular dysfunction and to investigate any relationship between hs-CRP values in chronic alcoholics and cardiac efficiency.

The unique part of our study was to look for an association between cardiac efficiency and hs-CRP. A large number of scientific papers have been published about hs-CRP and alcohol consumption in different parts of the world, but none has been reported in India. Little is known about association between markers of inflammation and alcohol consumption

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in Indian population where binge drinking pattern is prevalent. Abstinence from alcohol, weight loss, diet, exercise, and smoking cessation all lead to both reduced hs-CRP levels and reduced vascular risk. This study thus would be helpful in counseling the alcoholics and benefit the society.

MATERIALS AND METHODS

Chronic alcoholics admitted to the Velankini Rehabilitation ward, Father Muller's Medical Hospital were selected as subjects. Ethical committee clearance was obtained from our Institute. The subjects gave their informed consent.

The mean age of patients at baseline was 47.46 years, the mean BMI was 17.65 kg/m², All patients were male. Patients' alcohol related variables were as follows: Daily alcohol intake over 4 weeks before admission 1441 ± 224 ml/day (range 1280-1560 ml/day); duration of alcohol dependency 12.7 ± 8.1 years.

Group 1 consisted of 30 normal age matched male volunteers; Group 2 consisted of non-drinkers who had cardiovascular pathology (left ventricular failure, angina) and Group 3 consisted of 30 alcoholics with history of cardiovascular disease (CVD). The normal subjects were screened to rule out any cardiovascular pathology and had no history of hypertension, angina, diabetes, high cholesterol, heart disease, systemic inflammation and were not overweight or obese. Clinical findings, X-ray diagnosis of enlarged heart and ECG findings of tall R wave and deep S wave was done in the Medical ward of Father Muller's Hospital. The chronic alcoholic patients with alcoholic cardiomyopathy were chosen from their case sheets after they were evaluated in the medical ward. The hs-CRP estimation was done in all the subjects. The testing was done in the 1st week of admission.

hs-CRP activation buffer was estimated using the standard procedure adopted by Gupta et al (7). Harvard's step test was performed on chronic alcoholics to evaluate the cardiac efficiency (8). The step test was begun after a brief demonstration and practice period. After completion the subject was seated and his resting heart rate was measured. 30 double steps were performed by the subject for 3 minutes on a 20 inch high bench. The subject was then seated. Heart rate was measured for 30 second period from 1 minute into the recovery period. Cardiac efficiency was calculated.

Statistical analysis: ANOVA was used to compare the 3 groups using SPSS (Version 15). Karl Pearson correlation was used to determine the correlation between cardiac

efficiency and CRP values in chronic alcoholics.

RESULTS

ANOVA revealed significant differences between the 3 groups. Karl Pearson correlation revealed a significant correlation between the C-Reactive protein and cardiac efficiency ($r = 0.7328$, $p < 0.01$).

Table 1 : hs-CRP Levels of Control and Alcoholics with or without Cardiovascular disease

Group	n	Mean (SD)	95% CI	F Statistic (df)	p-value
Control	30	0.17 (0.16)	0.11, 0.23	226.74	0.001
Non alcoholics+ CVD	30	0.79 (0.41)	0.64, 0.95	(2,89)	
Alcoholics with CVD	30	1.67 (0.16)	1.60, 1.70		

DISCUSSION

Increase in CRP in non-drinkers with cardio-vascular disease indicates inflammatory state of the heart. Alcoholism is associated with cirrhosis of liver, pancreatitis, cardiovascular disease (9). Previous studies have shown that alcohol consumption results in an increase in markers of inflammation (10). In chronic alcoholics with cardio-vascular disease, hs-CRP shows further rise probably indicating the accelerated effect of alcohol on the heart and other organs. The primary estimation of hs-CRP can thus be carried out at the out patient settings and can be used as a global risk assessment. This can be used as an approach in primary prevention of cardiovascular complications which may occur in chronic heavy drinkers. Knowledge of hs-CRP levels can thus be used to distinguish patient sub groups into those needing conservative or aggressive treatment.

The possible mechanism by which hs-CRP increases in alcoholics could be as follows: In chronic alcoholics inflammation of the heart takes place. Inflammation is a localized protective response elicited by injury or destruction of tissues. C-reactive protein (CRP) is one of the acute phase proteins that increase during systemic inflammation. Inflammation is probably involved in coronary microcirculation abnormalities and coronary endothelial dysfunction in alcoholics (11).

The higher the hs-CRP value in chronic alcoholics, the lower the cardiac efficiency. This probably reveals the extent of damage of heart in chronic alcoholics. CRP levels, inversely

related to cardiac fitness, are important indicators of exercise tolerance and may be useful in targeting individuals requiring endurance intervention to prevent loss of cardiovascular fitness and function

Measures for fibrinogen, a biomarker involved in both inflammation and thrombosis, remain poorly standardized. Other broad measures of systemic inflammation, such as the white blood cell count or the erythrocyte sedimentation rate, have proven unreliable in clinical settings. By contrast, high-sensitivity assays for hs-CRP would prove to be a major leap in the diagnosis of inflammation and cardio-vascular diseases.

Studies conducted by Albert et al. in US have measured hs-CRP in moderate and chronic alcoholics and have shown that the CRP level is the lowest in moderate alcohol consumption (12). Hsu- Ko Kuo et al have reported that hs-CRP levels are inversely related to cardio-respiratory fitness and VO_{2max} and are important indicators of exercise tolerance (13). Heavy drinkers had higher CRP concentrations than moderate drinkers. The U-shaped association between hs-CRP and alcohol consumption has been reported from studies conducted in Russia (14). Light to moderate alcohol consumption was associated with significantly lower rates of cardiac events and longer survival (15).

Some limitations of our study deserve mention. First, self-report of alcohol intake by participants may underestimate the true consumption rate. Second, lack of information about the type of alcoholic beverages consumed is a theoretical limitation because some authors have suggested that beverage type may be associated with reduced atherosclerotic burden in experimental animals and improved lipid parameters.

hs-CRP levels have a long-term predictive value. hs-CRP can be standardized across for many commercial platforms. Treatment plan can be started early in chronic heavy drinkers even before they develop cardiac dysfunction. There is an increase in hs-CRP in chronic alcoholics with cardio vascular disease in comparison to non-drinkers with cardio vascular complications and a significant correlation between CRP and cardiac efficiency.

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