Correlation of Lipid Profile & Acute Inflammatory Markers in Rheumatoid Arthritis

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Abstract

Background: Rheumatoid arthritis (RA) primarily affect the synovium and is a chronic inflammation disease, which leads to joint damage and bone destruction. Causes of significant morbidity are due to result of synovial inflammation, joint destruction and associated disability. Many pieces of evidence suggest that proatherogenic disease associated with increased cardiovascular (CV) mortality is rheumatoid arthritis (RA). Addition to genetic and conventional CV risk factors, chronic inflammation has emerged as a key component of this process. Cardiovascular concerned demises shown a preferment in CRP among RA cases who have ongoing active inflammation that's why CRP can be self-sufficient pointer for cardiovascular disease. Subjects and Methods: Current study has been conducted in Teerthakar Mahaveer hospital, Teerthakar Mahaveer medical college. Data has been collected in duration of 12 months. After obtaining consent, data has been collected from 60 consecutive established case of rheumatoid arthritis. Almost equal number of participants were belonging to 30-39 years (16, 26.7%), 40-49 years (15, 25.0%), and 50-59 years (16, 26.7%) age groups. Very few participants were belonging to 20-29 years (4, 6.7%) and 60-69 years (9, 15.0%). Range of age was from 25 years to 69 years. Results: Pearson correlation coefficient of CPR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL-C were -0.326, -0.269, -0.307, -0.310 and -0.307 respectively. All the correlation coefficients were statistically significant (<0.05). Correlation coefficient of ESR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL-C were -0.294, -0.311, -0.226, -0.253 and -0.226 respectively. Among them correlation coefficient of ESR with total cholesterol (p-value=0.023) and HDL-C (p-value=0.016) were statistically significant (<0.05). Conclusion: General population danger of atherosclerosis surmount with increment in LDL and wane of HDL but in RA population there is wear off in HDL LDL and total cholesterol, when present in its inflammatory condition. There is a difference in the lipid trend in RA patient then the general population. Rheumatoid arthritis is a disease with lipid paradox. A high inflammatory burden determined by the mean values of ESR and CRP in active disease is associated with low lipid levels but more risk of CV events.

Keywords: LDL, HTL, ESR, CRP, RA.

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CRP, which is offered by the hepatocytes cell of liver under the impact of IL6 and TNF that’s why taken as indirect indicator of inflammation. This marker is allied with plaque building in vessel. Which further surmount the danger of cardiovascular phenomena.[17-19] This is also seen in various cohort study that cardiovascular concerned demises shown a preferment in CRP among RA cases who have ongoing active inflammation that's why CRP can be self-sufficient pointer for cardiovascular disease 28 In general population danger of atherosclerosis surmount with increment in LDL and wane of HDL, but in RA population there is wear off in HDL LDL and total cholesterol, when present in its inflammatory condition.[20,21] After giving treatment in these patient there is Surmount in total cholesterol HDL LDL and the interesting thing is that this surmount values are not related with danger of cardiovascular event.[21,22]

Inflammation is believed to play an important role in the progression of atherosclerosis, and it may be clarified by the systemic inflammatory response in RA. Data suggest that coronary mortality rises in early or advanced disease patients and is worse in women, a group that is generally at lower risk. Standardized cardiovascular disease death rates for people are about 1.3 and 1.9 for females.

Aim and objective: To study the lipid profile in patients of established rheumatoid arthritis. To study the association of lipid profile with inflammatory markers: “ESR (Erythrocyte sedimentation rate) and CRP (C reactive protein).”

Subjects and Methods

Study place
- The study will be conducted in the Teerthaker Mahaveer Medical College & Research Centre, Moradabad (Uttar Pradesh). Data taken from the patients attending both OPD and IPD.

Study Duration
- Study will be done for 12 months. After taking approval from ethical and research committee.

Sample method and sample size
- On the next visit of established rheumatoid arthritis patients in OPD; or IPD, blood samples will be taken and the level of different lipid components, ESR and CRP will be detected.
- All Cases will be selected for prospective study.
- In all instances, the test is latex fixation, check for rheumatoid factor was conducted.
- The blood samples were obtained from RA patients after 12 hours of overnight fasting, regular diet (without any fat restriction) for the previous two weeks, and abstinence from alcohol. Serum was separated from the blood and stored in the fridge. This was then used in analytical studies of lipoprotein.
- With commercially available reagents, the concentration of total cholesterol, HDL-cholesterol, and triglycerides was evaluated enzymatically.
- LDL-cholesterol concentration was calculated using the Fried Wald equation for participants with triglycerides (< 400 mg / dl) LDL = TC - HDL-c = TGL/5.
- Inflammation marker such as ESR has been measured using Wintrobe's method.

Selection of Patients is on the basis of following Inclusion & Exclusion Criteria

Inclusion criteria
- Diagnosed Patients of rheumatoid arthritis of either sex above the age of 18 years with disease duration of >6 months.

Exclusion criteria:
- Smokers
Diabetes mellitus
Hypothyroidism
Liver or kidney disease
Obesity (body mass index >/=25)
Patients receiving medications affecting lipid metabolism, such as lipid-lowering drugs, beta-blockers, oral contraceptives, estrogen, progestin, thyroxin and vitamin E, will be excluded from the study.

Statistical Analysis
It was carried out for 60 patients of established cases of rheumatoid arthritis. Base line data was collected from patients (after taking consent) age, sex, duration of illness, lipid profile, ESR and CRP were analyzed.

The correlation amid in lipid profile and ESR & CRP with the vindication of Pearson’s correlation coefficient method. Statistical significance was taken when p value <0.05.

Statistical analysis was carried out using standard formulae. Microsoft excel and SPSS (statistical package for social science) was used for data entry and analysis.

Results

Current study has been conducted in Teerthanker Mahaveer hospital, Teerthanker Mahaveer medical college. Data has been collected in duration of 12 months. After obtaining consent, data has been collected from 60 consecutive established case of rheumatoid arthritis.

Almost equal number of participants were belonging to 30-39 years (16, 26.7%), 40-49 years (15, 25.0%), and 50-59 years (16, 26.7%) age groups. Very few participants were belonging to 20-29 years (4, 6.7%) and 60-69 years (9, 15.0%). Range of age was from 25 years to 69 years. [Table 1]

Table 1: Descriptive statistics of lipid profile parameter Total number of observations n=60

| Lipid profile parameter | Minimum | Maximum | Mean | Std. Deviation |
|-------------------------|---------|---------|------|----------------|
| Total Cholesterol (mg/dl)| 111.0   | 310.0   | 196.6| 43.7           |
| HDL-C (mg/dl)           | 26.0    | 61.0    | 41.6 | 7.5            |
| Triglyceride (mg/dl)    | 70.0    | 465.0   | 222.2| 96.4           |
| LDL-C (mg/dl)           | 65.2    | 182.0   | 107.8| 22.4           |
| VLDL-C (mg/dl)          | 14.0    | 93.0    | 44.4 | 19.2           |

Most of the participants were female (52, 86.7%). Only few (8, 13.3%) were males.

Mean (SD) of Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL were 196.6(43.7) mg/dl, 41.6(7.5) mg/dl, 222.2 (96.4) mg/dl, 107.8(22.4) mg/dl, and 44.4 (19.2) mg/dl respectively. [Table 2]

Table 2: Descriptive statistics of acute phase reactants

| ESR (mm per hour) | 8.0 | 118.0 | 37.3 | 27.06174 |
|-------------------|-----|-------|------|----------|
| CRP (mg/dl)       | 0.4 | 9.8   | 1.9650| 2.04017  |

Table 3: Correlation of CRP with Lipid Profile parameters

| Parameter   | Pearson Correlation | P value |
|-------------|---------------------|---------|
| Total Cholesterol | -0.326*             | 0.011   |
| HDL-C        | -0.269*             | 0.037   |
| Triglyceride | -0.307              | 0.017   |
| LDL-C        | -0.310*             | 0.016   |
| VLDL-C       | -0.307*             | 0.017   |

*Statistically significant (p value< 0.05)

Pearson correlation coefficient of CPR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL-C were -0.326, -0.269, -0.307, -0.310 and -0.307 respectively. All the correlation coefficients were statistically significant (<0.05).

Table 4: Correlation of ESR with Lipid Profile parameters

| Parameter   | Pearson Correlation | P value |
|-------------|---------------------|---------|
| Total Cholesterol | -0.294*             | 0.023   |
| HDL-C        | -0.311*             | 0.016   |
| Triglyceride | -0.226              | 0.082   |
| LDL-C        | -0.253              | 0.051   |
| VLDL-C       | -0.226              | 0.082   |

*Statistically significant (p value< 0.05)

Correlation coefficient of ESR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDLC were -0.294, -0.311, -0.226, -0.253 and -0.226 respectively. Among them correlation coefficient of ESR with total cholesterol (p-value=0.023) and HDL-C (p-value=0.016) were statistically significant (<0.05).

Discussion

RA is systemic inflammatory disease with increased risk of CV diseases. Active RA is a disease with high burden of inflammatory markers and associated with decreased Total cholesterol. LDL-cholesterol and HDL-cholesterol[21] current study has been conducted in Teerthanker Mahaveer Hospital, Teerthanker Mahaveer medical college. Data has been collected in duration of 12 months. After obtaining consent, data has been collected from 60 consecutive established case of rheumatoid arthritis.

In our study, almost equal number of participants were belong to 30-39 years (16, 26.7%), 40-49 years (15, 25.0%), and 50-59 years (16, 26.7%) age groups. Very few participants were belong to 20-29 years (4, 6.7%) and 60-69 years (9, 15.0%). Range of age was from 25 years to 69 years.
years. Mean age of participants was 47.05 years with standard deviation of 11.7 years. These finding are similar to previous studies conducted by Muzahim F et al,\(^{[23]}\) and Wan Heeyoo et al,\(^{[24]}\)

In our study, we found that mean (SD) of Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL were 196.6(43.7) mg/dl, 41.6(7.5) mg/dl, 222.2(96.4) mg/dl, 107.8(22.4) mg/dl, and 44.4(19.2) mg/dl respectively. Total cholesterol values of our study (mean 196.6, SD 43.7 mg/dl) are in accordance with previous research conducted by Svenson KL et al,\(^{[25]}\) Rantapaa-DahlqvistS et al,\(^{[26]}\) and Lazarevic MB et al,\(^{[27]}\) Mean HDL-C of our study (mean 41.6, SD 7.5 mg/dl) is also similar to studies conducted by Curtis et al,\(^{[28]}\) Dursunoglu D et al,\(^{[29]}\) and chen et al,\(^{[30]}\) Values obtained for Triglyceride (mean 222.2, SD 94.4mg/dl) are in the direction of other studies conducted by Vinapamula K S et al,\(^{[31]}\) and Curtis et al,\(^{[32]}\) It was also observed that values of LDL-C (mean 107.8, SD 22.4mg/dl) found in our study is in accordance to Dursunoglu D et al,\(^{[29]}\) and Curtis et al,\(^{[32]}\) Mean VLDL values in our studies were 44.4 mg/dl(with SD 19.2mg/dl).

In this research, Mean (SD) of ESR was 37.3 (SD 27.0) mm in 1st hour, which is in accordance with previous researches conducted by Der yuanchen et al,\(^{[30]}\) and Muzahim et al,\(^{[23]}\) In our study, Mean (SD) CRP was 1.9 (SD 2.0) mg/dl. The inflammatory markers (CRP/ESR) are high in active disease and low in inactive disease. In current study, Mean Total cholesterol, LDL–cholesterol and Triglycerides were found to be increased, but HDL–cholesterol was decreased. In this research, Pearson correlation coefficient of CPR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL-C were -0.326, -0.269, -0.307, -0.310 and -0.307 respectively. All the correlation coefficients were statistically significant (<0.05). Similar observations (Negatively correlated CPR and Lipid profile parameters) were also noted by Douglas et al,\(^{[32]}\) Robertson J et al,\(^{[33]}\) Athanasios et al,\(^{[33]}\) and Hyon K Choi et al,\(^{[34]}\)

In current study, Correlation coefficient of ESR with Total cholesterol, HDL-C, Triglyceride, LDL-C and VLDL-C were -0.294, -0.311, -0.226, -0.253 and -0.226 respectively. Among them correlation coefficient of ESR with total cholesterol (p-value=0.023) and HDL-C (pvalue=0.016) were statistically significant (<0.05). These findings are in accordance with studies conducted by Douglas et al,\(^{[32]}\) and Athanasios et al,\(^{[33]}\)

In general population danger of atherosclerosis surmount with increment in LDL and wane of HDL but in RA population there is wear off in HDL, LDL and total cholesterol, when present in its inflammatory condition. There is a difference in the lipid trend in RA patient then the general population. Rheumatoid arthritis is a disease with lipid paradox. A high inflammatory burden determined by the mean values of ESR and CRP in active disease is associated with low lipid levels but more risk of CV events. There is oxidative modification in LDL morphology and along with this decrement in the apolipoprotein A1 values. Paraoxnase- one is an enzyme with antioxidant anti-inflammatory and antiatherogenic activity, there is reduction in this activity of paraoxnase led atheroma formation.

**Conclusion**

A better grip on the activity of RA lesser chances of cardiovascular event in these patients. Use of statin in RA is considerable in atherosclerotic cardiovascular disease. Norwegian researcher sem at al tell from his perusal tell that statin lead to wane in lipid value and 20% decrement in the total cardiovascular risk in active disease with respect to inactive RA. Rollefstad et al also value the use of statin. McCarey et al appraise statin (atorvastatin) role in disease activity through this he rooted moderate decrease in disease activity and reformation in lipid. So regardless of lipid value statin have to be considered in RA.

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Jain et al: Correlation of Lipid Profile & Acute Inflammatory Markers in Rheumatoid Arthritis

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