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Original Article

Study of Serum Lipid Profile and Vitamin E in Rheumatoid Arthritis

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ABSTRACT

Introduction: Rheumatoid Arthritis (RA) is a chronic systemic inflammatory disorder that may affect many tissues and organs but principally affects the joints.Aims and objects: To access serum lipid profile as well as atherogenic index – Total cholesterol/HDL cholesterol, LDL cholesterol/HDL cholesterol among the RA patients and compare the results with that of control group and also to estimate Vitamin E levels in cases and compare it with controls. Method: This study was conducted in Department of Biochemistry in collaboration with Department of Medicine in Regional Institute of Medical Sciences, Imphal. Fifty diagnosed cases of Rheumatoid Arthritis and thirty healthy age and sex matched individuals were included in this study. Serum triglycerides, HDL cholesterol, LDL cholesterol, VLDL cholesterol and Vit E were estimated in these groups. Results: Among cases the values of Vit E were significantly lower (0.25 ± 0.06 mg/dl ± SD) as compared to controls (1.12 ± 0.23 mg/dl ± SD). S. VLDL (30.09 ± 3.33 mg/dl ± SD) and S. LDL (220.96 ± 34.19 mg/dl ± SD) values were significantly higher among cases (18.57 ± 4.63 mg/dl ± SD, 36.2 ± 15.59 mg/dl ± SD respectively in controls).The value of S. HDL was found to be significantly lower (25.04 ± 6.27 mg/dl ± SD) in cases as compared to controls (58.83 ± 11.43 mg/dl ± SD). Among cases values of Total chol/HDL chol (11.78 ± 3.47) and LDL chol/HDL chol (9.48 ± 3.18) were also higher than controls (1.99 ± 0.42,0.66 ± 0.37 respectively)Conclusion: These findings strongly confirmed that patients with RA have significantly lower values of vitamin E and HDL compared to controls while higher values of other parameters of lipid profile and higher atherogenic indices.

INTRODUCTION

Rheumatoid Arthritis (RA) is a chronic systemic inflammatory disorder that may affect many tissues and organs but principally affect the joints. Rheumatoid Arthritis (RA) affects between 0.5 to 1% of the adult population worldwide. RA can start at any age, but the peak age of onset is between 30 and 55 years.It affects 1-2% of the total population of the world[1]. Every year 0.5% to 1% of the total population suffer from RA in both developed and developing countries[2]. However the incidence are lowered in East South Asia. Epidemiological studies have shown an increased premature mortality in patients with RA compared with general population[3, 4]

There are reports of altered serum lipid levels in various inflammatory diseases including RA. Lipids may contribute to the synovitis in RA through participation in arachidonic acid pathway within the joint space[5]. Increased levels of total cholesterol (TC), Low Density Lipoprotein (LDL) and Triglycerides (TG) has been reported in patients with RA[6].

The serum Total Cholesterol and High Density Lipoprotein (HDL) levels in RA are inversely correlated with disease activity suggesting a potential role for inflammation in the atherogenic profile and higher atherosclerotic risk observed in RA[7,8]. As a consequence of reduction in HDL cholesterol, the atherogenic ratio of total cholesterol/HDL cholesterol as well as LDL cholesterol/HDL cholesterol were significantly higher in RA. This is so called atherogenic index is an important prognostic marker for future cardiovascular disease, the desirable ratio is four or lower[9].

The apparent reduction of total cholesterol may result from reduced synthesis, increased clearance via the scavenger receptor pathway or increased oxidation triggered by inflammatory process[10].

Vitamin E is the major lipid soluble anti-oxidant found in cells. Vitamin E is critical to maintain the normal function of the immune system. Elevated lipid peroxidation and depleted vitamin E has been reported in patients with RA[11,12]. The inflammatory environment and disturbed antioxidant mechanism in rheumatoid arthritis may promote LDL oxidation thereby facilitating atherogenic and higher cardiovascular risk.

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Table 1 - Mean age ± SD in both control and RA cases

SEX	CONTROLS (n=30)		Rh. Arthritis cases (n=50)	
	No. of cases	Mean age ± SD (in years)	No. of cases	Mean age ± SD (in years)
Male	8	53.5 ± 8.64	11	61.82 ± 12.38
Female	22	53.45 ± 9.50	39	52.77 ± 9.97
Total	30	53.47 ± 9.13	50	54.76 ± 11.07

Table 2 - Summary of biochemical parameters in control and RA cases (values expressed in terms of Mean ± SD)

Parameters (from serum)	Controls (n=30) Mean(mg/dl) ± SD	RA cases (n=50) Mean(mg/dl) ± SD
Vitamin E	1.12 ± 0.23	0.25 ± 0.06***
S. Cholesterol	113.6 ± 13.73	276.9 ± 31.84***
S. Triglycerides	92.93 ± 22.77	154.54 ± 17.01
S. HDL	58.83 ± 11.43	25.04 ± 6.27***
S. VLDL	18.57 ± 4.63	30.9 ± 3.33***
S. LDL	36.2 ± 15.59	220.96 ± 34.19***
Total chol/HDL chol	1.99 ± 0.42	11.78 ± 3.47***
LDL chol/HDL chol	0.66 ± 0.37	9.48 ± 3.18***

*** P < 0.001

Table 3 - Serum Vitamin E (mean ± SD) levels in cases and controls

sex	Serum Vitamin E (mg/dl ± SD)		P value
	Controls (n=30)	RA Cases (n=50)	
Male	1.2 ± 0.26	0.28 ± 0.07	.008
Female	1.09 ± 0.22	0.24 ± 0.05	.000
Total	1.12 ± 0.23	0.25 ± 0.06	.000

Table 4 - Total Chol/HDL chol (mean ± SD) in controls and RA cases

sex	Total chol/HDL chol (ratio ± SD)		P value
	Control (n=30)	RA Cases (n=50)	
Male	1.89 ± 0.34	11.58 ± 3.43	.000
Female	2.03 ± 0.44	11.84 ± 3.52	.000
Total	1.99 ± 0.42	11.78 ± 3.47	.000

Table 5 - LDL Chol/HDL chol (mean ± SD) in controls and RA cases

sex	LDL chol/HDL chol (ratio ± SD)		P value
	Control (n=30)	RA Cases (n=50)	
Male	0.61 ± 0.34	9.29 ± 3.13	.000
Female	0.68 ± 0.39	9.53 ± 3.24	.000
Total	0.66 ± 0.37	9.48 ± 3.18	.000

Discussion:

The present study showed that 60% of RA cases were in age group of 51 – 60 years. The mean age ± SD of RA cases was 54.76 ± 11.07 years. The disease was found to be more prevalent in the middle aged population.These findings are similar with Georgiadis AN et al[18] and Myasoedova E et al [19]. It may be due to higher prevalence of metabolic syndrome, a proinflammatory state which is common among the middle aged people. The expanded adipose tissue is thought to represent a source of proinflammatory cytokines (i.e. interleukin 6 and tumor necrosis factor – α). Previous studies suggest that RA disease activity correlates with metabolic syndrome, implicating a significant role for the inflammatory burden in the evolution of metabolic disturbances in patients with RA[20]. The high prevalence of RA in middle aged population may also be due to increased fat mass and reduced physical activity.

In the present study, 78% RA patients were females and 22% were males. These findings are consistent with other studies which showed highest prevalence of RA among females[21, 22].

Study results showed that serum vitamin E concentration was significantly decreased in RA cases as compared to normal controls. This might be due to the oxidative stress in RA patients due to an increased level of reactive oxygen species (ROS) as well asreduced antioxidative mechanisms[23].

All the parameters of serum lipid profile which include Total Cholesterol (TC), Triglycerides (TG), Very Low Density Lipoprotein (VLDL) and Low Density Lipoprotein (LDL) were elevated except High Density Lipoprotein (HDL), which was diminished significantly among RA study group as compared to control group. This may be due to the fact that RA patients are genetically predisposed to the development of RA related dyslipidemia or the transcription of these genes can be altered by persistent inflammation[24].

In the present study the atherogenic index in the form of Total Cholesterol/HDL cholesterol and LDL cholesterol/HDL cholesterol were found to be much higher than the desirable ratio of five or lower. A higher index implies an increased cardiovascular risk and lowering this ratio has shown to decrease this risk.

Conclusion:

The present study showed that RA is predominantly found among the middle aged female population.Patients with RA have significantly lower values of vitamin E and HDL compared to controls. Significantly higher values of other parameters of lipid profile were found among RA patients. Higher atherogenic indices indicate higher cardiovascular risk among RA patients.

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