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STUDY OF LIPID STATUS IN PARKINSON'S DISEASE

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Abstract:
Background &Method: The aim of the study is to determine lipid status in one of the common neurodegenerative disease i.e Parkinson's disease patients. 5 ml fasting blood samples from patients sex & age matched controls were collected from antecubital vein, with all aseptic precaution in plain vacutainers.

Result: Serum total cholesterol level and LDL cholesterol was significantly low in Parkinson's patients as compared with control group. Serum HDL cholesterol level was slightly low, but not significantly different as compared with controls.

Conclusion: Finally from our work we observed that Serum Total cholesterol and Serum LDL cholesterol levels are significantly decreased, in Parkinson's disease patients as compared with controls. Serum HDL cholesterol is slightly decreased & did not show any statistical difference in Parkinson's disease patients as compared with healthy controls suggesting dysregulation of lipid metabolism in PD patients.

Keywords: lipids, Parkinson's disease, HDL, LDL.

Study Designed: Observational Study

1. INTRODUCTION

Parkinson's disease (PD) is the second commonest neurodegenerative disease after Alzheimer(1). According to the United Nations, at least six million people are affected with PD worldwide. (2).
Parkinson's disease occurs when certain neurons of the brain, mostly in the substantia nigra die or become impaired. The symptoms of Parkinson's disease result from the loss of these dopamine-secreting (dopaminergic) cells & subsequent loss of melanin, secreted by the same cells, in the parscompacta region of the substantia nigra (also known as black substance).
This leads to inhibition of the direct pathway of movement & activation of the indirect pathway of movement. Since the direct pathway facilitates movement & the indirect pathway

inhibits movement, the loss of these cells leads to a hypokinetic movement disorder. The lack of dopamine results in an excessive inhibition of the thalamus, leading to hypokinesia (3).
Parkinson's disease has worldwide prevalence & is the second most prevalent movement disorder in elderly people. However, it probably is an under diagnosed disease in South Asia because all of the major clinical features of the disease such as tremors, slowing of movement as well as posture abnormality, are considered as a feature of normal ageing by the general population.
The role of lipids in the aetiology & progression of Parkinson's disease (PD) is still unclear. Lipids, particularly cholesterol, are the important component of the myelin sheath & the membranes of neurons & astrocytes, that play crucial role in the development & regulation of synaptic function & plasticity. Lipid regulates thickness of cell membrane, its permeability/fluidity & function of membrane associated proteins (transporters, receptors) (4).

2. MATERIAL & METHOD

The present study was conducted in Department of Biochemistry, MGM Medical College, Indore. Hundred patients of PD (72 males & 28 females) were enrolled in the study & further grouped based on gender. Equal number of clinically examined Parkinson's disease-free healthy persons with comparable age were taken as control. Clinically newly diagnosed cases of PD from neurology OPD were enrolled in the study and detailed clinical history was noted as per proforma. 5 ml fasting blood samples from patients & controls were collected from antecubital vein, with all aseptic precautions in plain vacutainers. Serum sample was separated from all blood samples and lipid profile parameters were estimated in all samples that included total cholesterol, HDL cholesterol and LDL cholesterol by standard methods with appropriate use of controls.

Inclusion criteria:
1) Male & female patients diagnosed as Idiopathic Parkinson's disease aged between 50 to 70 years in the initial stage of disease (1-2 years) without any drug therapy.
2) Willing to participate in study & provide informed consent.
3) Control group included healthy volunteers who were consistent with the patients according to age, sex & body mass index.

Exclusion Criteria:
1) Individuals having blood disorders, obvious malignancy, hepatic, renal, cardiac or thyroid disease & additional history of alcohol or smoking were excluded from the study.
2) Individuals on any concomitant medication such as Lipid lowering drugs, antioxidants, vitamins or minerals, were excluded from study.

3. RESULTS:

Out of 100 PD cases 72were male and 28were female with M:F ratio of 2.57:1. Similar ratio was taken in control group (Table no. 1). The mean total cholesterol level in PD patients was

136.66 ± 22.5 mg/dl, while the control group had mean value of 198.89 ± 08.2 mg/dl. Thus the total cholesterol level in PD patients was significantly lower compared then control group (P< 0.001) (Table no. 2).The mean value of HDL cholesterol in PD patients (39.42 ± 10.8 mg/dl) was relatively lower than the control group (42.11 ± 12.1 mg/dl) but statistically no significant difference was seen (P>0.05). On comparing the mean LDL cholesterol levels between control group (97.41 ± 8.1 mg/dl) and PD patients (64.52 ± 7.2 mg/dl) statistically highly significant difference was seen (P<0.001) with much lower levels in PD patients.

Table Number 1: Gender wise distribution of cases and controls

	Control (n = 100)	**PD patients (n = 100)**	**P Value**
Men	70	72	P > 0.05
Women	30	28	
Mean age ± SD	61.05 ± 1.6	60.97 ± 5.2	

No significant difference in age of Parkinson's disease patients as comparedwith controls.

Table No 2: Serum Total cholesterol levels in case and control groups

N= 100 each group	**Total Cholesterol (mg/dl)**	**P Value**
		P < 0.001
Control	198.89 ± 08.2	
PD patient	136.66 ± 22.5	

Serum total cholesterol levels was significantly low as compared with controls.

Table No 3: Serum HDL cholesterol levels in case and control groups

N= 100 each group	**HDL Cholesterol (mg/dl)**	**P Value**
		P > 0.05
Control	42.11 ± 12.1	
PD patient	39.42 ± 10.8	

Serum HDL cholesterol level was slightly low, but not significantly different statistically as compared with controls.

Table No 4: Serum levels of LDL cholesterol in case and control groups

N= 100 each group	**LDL Cholesterol (mg/dl)**	**P Value**
		P < 0.001
Control	97.41 ± 8.1	
PD patient	64.52 ± 7.2	

Serum LDL cholesterol levels was significantly low as compared with controls.

4. DISCUSSION

The role of lipids in the aetiology & progress of Parkinson's disease (PD) is still unclear. Lipids, particularly cholesterol, is the important component of the myelin sheath & the membranes of neurons & astrocytes. It plays a crucial role in the development & regulation of synaptic function & plasticity. There is good evidence that high serum total cholesterol level increases coronary heart disease risk in both middle & old age people & in people with high blood pressure levels. However, the association between serum cholesterol level & several neurodegenerative disease risks has been debated.

As reported in previous study that high serum levels of total cholesterol were associated with a significant decreased risk of PD in women (5). Serum LDL-cholesterol levels were significantly lower in PD patients compared to PD patient's spouses & non PD patient's spouses (6).

Parkinson's disease risk is not significantly related to history of hypertension, hypercholesterolemia, or diabetes but may modestly decline with increasing blood cholesterol levels (7). Low intake of cholesterol, particularly in the presence of high iron, may be associated with an increased risk of PD (8).Contrary to the above results, in a Finnish cohort study G.Hu et al suggested that higher serum levels of total cholesterol increased risk of developing PD in men & women aged 25-54 years at baseline (9).

Evidence is accumulating that alterations in metabolism of cholesterol & other lipids are involved in the pathogenesis of neurodegenerative diseases. Several lines of evidence also indicate a role of lipid metabolism in the pathogenesis of PD. Decreased cholesterol synthesis was observed in skin fibroblasts from patients with PD (10) &lower levels of total cholesterol & LDL cholesterol have been described in PD patients compared with controls

5. CONCLUSION

Finally from our work we observed that serum Total cholesterol and serum LDL cholesterol levels were significantly decreased, in PD patients as compared with controls but serum HDL cholesterol was slightly decreased & did not show any statistical difference in PD patients as compared with healthy controls. Suggesting a role of dyslipidemia particularly decreased cholesterol and LDL cholesterol in development of neurodegenerative diseases such as Parkinson's disease

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