



**ORIGINAL RESEARCH PAPER**

**Paediatrics**

**A COMPARATIVE STUDY OF LIPID PROFILE PATTERN DURING FIRST EPISODE, REMISSION AND RELAPSE OF IDIOPATHIC NEPHROTIC SYNDROME IN CHILDREN**

**KEY WORDS:** Nephrotic syndrome, relapse, cholesterol, triglyceride.

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**ABSTRACT**

**Introduction:** The aim of the study is to compare lipid profile pattern during first episode, remission and relapse of idiopathic nephrotic syndrome in children and establish the relationship among the levels of lipid profile parameters during remission and relapse

**Materials and methods:** Thirty eight relapse cases and 10 non relapse cases of idiopathic nephrotic syndrome were compared in terms of serum cholesterol, triglycerides, HDL, LDL and VLDL at initial attack, remission, follow up period and relapse.

**Results and analysis:** High cholesterol, triglyceride and VLDL levels during initial attack as well remission in relapse cases was found to be statistically significant.

**Conclusion:** Monitoring of lipid profile following remission can predict future relapse.

**Introduction**

Childhood nephrotic syndrome (NS) is a chronic glomerular disease, characterized by minimal change disease in majority of cases.<sup>1</sup> Hyperlipidemia has been recognized as an important characteristic of idiopathic NS in children since 1917 and is usually observed during the active phase of the disease and disappears with the resolution of the proteinuria.<sup>2</sup> Although pathophysiological aspects of hyperlipidemia have not been completely identified, hypoalbuminemia, increased lipoprotein synthesis and decreased lipoprotein lipase activity are described by various workers.<sup>3</sup> The persistence and severity of lipid changes in serum correlates well with the duration and frequency of the relapses even during remission. This leads to increased risk of atherosclerosis in later life and the development of progressive renal injury.<sup>4</sup> Hence close monitoring of lipid levels during remission of nephrotic syndrome is necessary to select high risk patients and to predict chances of relapses. It has been noted that certain factors like diet, malnutrition, genetic traits are known to alter the frequency and severity of lipid pattern. The Indian patients have a different dietary, constitutional and genetic background. Hence we undertook a study with the following objectives: 1) To study the levels of serum cholesterol, triglycerides, HDL, LDL and VLDL at initial attack, remission, follow up period and relapse in idiopathic NS, 2) To establish the relationship among the levels of lipid profile parameters during remission and relapse.

**Materials and methods**

An observational prospective study was conducted over 50 children aged 2-12 years, admitted with NS in Department of Paediatrics, R.G. Kar Medical College and Hospital, a tertiary care centre of West Bengal. They were subsequently followed up at Paediatric Nephrology OPD in the same institution. The study period was of 1 year from October 2015 to September 2016. Inclusion criteria for subjects were: 1) Children presenting with typical features of minimal change NS for the first time, 2) Relapse cases of minimal change NS. Any of the following was excluded: 1) Non minimal change NS, 2) Patients with prior history of diabetes mellitus, hypothyroidism and familial hypercholesterolemia, 3) NS secondary to systemic disease such as systemic lupus erythematosus, Henoch-Schonlein purpura, malignancy (lymphoma and leukaemia) and infections (hepatitis, HIV and malaria). Blood was collected for biochemical analysis of lipid profile (Total cholesterol, HDL, LDL, VLDL, triglycerides) within 48 hours of admission in hospital during initial attack of NS, during remission (3 or more days of trace or negative on dipstick testing), three subsequent follow-up period and as soon as symptoms appear. Data were recorded in pre-tested proforma meeting the objectives of the study and were analysed with help of SPSS statistical software.

**Results and analysis**

Among 50 subjects, 2 cases were lost in follow up, so our study

population was 48. Of 48 subjects, 38 were relapse cases and 10 were non relapse. Fifty seven percent were females and 2-6 years aged children were predominantly affected. (Tables 1 and 2).

**Table 1: Gender wise distribution of study population in relapse and non relapse cases.**

Outcome	Male	Female	Total (n=48)
Relapse	17(44.7%)	21(55.3%)	38
Non Relapse	4(40%)	6(60%)	10
Total	21(43%)	27 (57%)	48

**Table 2: Age wise distribution of study population in relapse and non relapse cases.**

Age group (years)	Relapse	Non Relapse	Total (n=48)
2-6	22(57.9%)	6(60%)	28(58%)
7-12	16(42.1%)	4(40%)	20
Total	38	10	48

Mean serum cholesterol, triglyceride, HDL, LDL and VLDL, all were higher during initial attack of NS when compared to remission. High cholesterol, triglyceride and VLDL levels during initial attack as well remission in relapse cases was found to be statistically significant while serum HDL level was significantly high in initial attack of relapse cases only. Serum LDL levels were statistically insignificant in all conditions. (Table 3, 4, 5, 6).

**Table 3: Comparison of serum cholesterol levels during initial attack and remission in relapse and non relapse cases**

		Range (mg/dl)	Mean (mg/dl)	Standard Deviation	p value
Initial attack	Relapse	302-948	502.47	157.58	0.001
	Non Relapse	250-392	336.70	49.51	0.055
Remission	Relapse	250-645	373.82	89.73	0.01
	Non Relapse	152-252	195.40	35.01	0.50

**Table 4: Comparison of serum triglyceride levels during initial attack and remission in relapse and non relapse cases**

		Range (mg/dl)	Mean (mg/dl)	Standard Deviation	p value
Initial attack	Relapse	160 - 684	280.95	113.49	0.000
	Non Relapse	130-222	184.20	25.79	0.132
Remission	Relapse	120-380	200.68	64.32	0.002
	Non Relapse	70-130	88.40	18.59	0.117

**Table 5: Comparison of serum HDL levels during initial attack and remission in relapse and non relapse cases**

		Range (mg/dl)	Mean (mg/dl)	Standard Deviation	p value
Initial attack	Relapse	36-80	59.95	10.46	0.0023
	Non Relapse	38-68	56.00	10.24	0.154

Remission	Relapse	36-80	59.76	10.11	0.082
	Non Relapse	38-68	56.20	10.17	0.061

**Table 6: Comparison of serum LDL levels during initial attack and remission in relapse and non relapse cases**

		Range (mg/dl)	Mean (mg/dl)	Standard Deviation	p value
Initial attack	Relapse	41-157	95.71	31.74	0.339
	Non Relapse	8-92	59.60	24.88	0.346
Remission	Relapse	38-124	73.13	21.67	0.066
	Non Relapse	2-64	32.30	21.28	0.657

**Table 6: Comparison of serum VLDL levels during initial attack and remission in relapse and non relapse cases**

		Range (mg/dl)	Mean (mg/dl)	Standard Deviation	p value
Initial attack	Relapse	32-140	57.87	23.02	0.000
	Non Relapse	26-45	36.90	5.26	0.16
Remission	Relapse	24-76	40.13	12.87	0.002
	Non Relapse	14-26	17.70	3.71	0.119

**Discussion**

This study showed that there was female predominance and female: male ratio was approximately 1:0.8. Similar study done in Canada<sup>7</sup> showed female: male ratio to be 1: 0.9 though Srivastava et al<sup>6</sup> showed male predominance in India. Fifty eight percent of children were between 2-6 years of age. Kumar J et al<sup>7</sup> found mean age of idiopathic NS to be 7.9 ± 5.1 years. They also proved that under 8 children were the most common candidates for minimal change disease (MCD) whereas Focal segmental glomerulosclerosis (FSGS) was prevalent above 8 years. MCD could be differentiated from non MCD subtype by younger age at onset, absence of hypertension, and absence of microscopic hematuria.<sup>7</sup>

Serum total cholesterol level in our study was found to be higher than normal in idiopathic NS. More importantly, statistically significant higher cholesterol levels were seen in relapse cases. Hence, higher serum total cholesterol level during remission of idiopathic NS has higher chance of future relapse. These findings were supported by a study of Mahmud S et al<sup>8</sup> who showed among the relapsers, mean cholesterol (334 ± 46 vs. 232 ± 34 mg/dL; p<0.05) was significantly higher than that of non relapsers during remission. In our study, among relapsers, mean cholesterol level during remission (377.82 ± 89.73 vs 195.40 ± 35.01 mg/dl; p=0.01) was significantly higher than mean total cholesterol level of non relapsers. However, the cholesterol levels of our subjects were lower than that reported in Western literature (1000 vs 500 mg/dl).<sup>9</sup>

Serum triglyceride and VLDL levels were again found to be higher in relapsers with marked statistical significance (p<0.000 in initial attack, p<0.002 in remission). Similar study by Krishnaswamy D et al<sup>10</sup> concluded that mean serum triglyceride level during admission was 424.0 ± 14.3 mg/dl and this value was much higher than our study value. During remission, serum triglyceride in relapsers was 200.68 ± 64.32 mg/dl (p=0.002). Same in non relapsers was 88.40 ± 18.59 mg/dl and mean triglyceride value during discharge after remission was 127 ± 39 mg/dl. VLDL followed the same trend as triglyceride. So, higher serum triglyceride and VLDL level during remission had higher chance of relapse.

Serum HDL during initial attack in relapse cases was 59.95 ± 10.46 mg/dl and it was significant (p=0.02) although in rest of the conditions there was no significant elevation of HDL level. Similar findings were mentioned in other studies.<sup>10</sup>

The present study showed that children with higher levels of serum total cholesterol, triglyceride and VLDL during remission of NS have higher chance of relapse NS. Sreenivasa B et al<sup>11</sup> in a similar recent study found that lipid profile in first episode of NS reached normal value during remission, whereas in relapse cases, it remained persistently elevated even during the remission. Merouani et al<sup>12</sup> observed that hyperlipidemia during the active phase of the disease disappeared with resolution of the proteinuria but in frequently relapsing children it continued to be abnormal. In

relapse cases serum lipids were higher probably due to persistence of hyperlipidemia of previous episode. That serum cholesterol could be regarded as predictor of relapse in childhood idiopathic NS, was concluded by Mahmud S et al from a study in Bangladesh.<sup>8</sup>

**Conclusion**

Frequent monitoring of serum total cholesterol, triglyceride and VLDL following remission of NS and after completion of oral prednisolone course is simple, reliable, inexpensive and cost effective method to predict future relapse.

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