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Comprassion the Lipid Profile among Children Suffreing from Nephrotic Syndrome before and after Remission

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The study aimed to investigate serum cholesterol, triglycerides, LDL (low density lipoprotein), VLDL (very low-density lipoprotein), and HDL (high density lipoprotein) levels in nephrotic syndrome at the onset and during remission in first episode and relapse cases, as well as the relationship between dyslipidemia persistence and severity and disease duration and relapse frequency.
Materials and Methods: A hospital-based prospective study including 30 children aged 0 to 12 years with nephrotic syndrome. They were steroid responsive in 22 cases and steroid dependent in 8 cases. They were assessed clinically and a lipid profile was taken at the start, during remission, and after treatment. A total of 30 children without liver or kidney disease were included as controls.
Results: The mean blood cholesterol, triglycerides, LDL, and VLDL all increased significantly (p0.005). When compared to controls, HDL levels increased dramatically (P value 0.001) after nephrotic syndrome treatment. Lipid levels (serum cholesterol, triglycerides, LDL, VLDL) were significantly lower during remission in first-episode nephrotic syndrome cases, whereas lipid levels were significantly greater even during remission in recurrent cases. After treatment, total

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cholesterol and TGL levels were found to be higher, with P values of 0.004 and 0.004 respectively, as the duration of disease increased.

Conclusion: The current investigation demonstrates that widespread hyperlipidemia is present in nephrotic syndrome. When compared to recently diagnosed with NS, this was much higher in relapse cases. Lipid profiles return to normal during remission recently diagnosed with NS, but they are considerably higher in recurrence instances, even during remission. As a result, there is a justification for treatment.

Keywords: Nephrotic syndrome; cholesterol; LDL; VLDL; HDL.

1. INTRODUCTION

Hippocrates' was the first to notice that "when bubbles settle on the surface of urine, they signal kidney disease." The nephrotic syndrome is a group of diseases that affect the kidneys [1-5]. Heavy proteinuria and hypoalbuminemia, as well as edema, hypercholesterolemia, and wide spread hyperlipidemia, characterize this clinical condition. Lipoprotein is essential for the transport of lipids in the blood. Throughout India, nephrotic syndrome is a typical kidney problem in children. At minimum 150,000 to 200,000 cases exist among Indian children, with only an overall incidence of 12–16 cases per 100,000 population as well as an annual occurrence of [6]. 5–2 new cases per 100,000 population, and around 10,000 cases reported are added every year. 1 Excessive proteinuria, hypoalbuminemia (serum albumin 2.5 g/dl), hyperlipidemia (serum cholesterol >200 mg/dl), and oedema all are indications of nephrotic syndrome. If early in the morning urine protein is 3+/4+ (on dipstick or boiling test), spot protein/creatinine ratio >2 mg/mg, or urine albumin excretion >40 mg/m2 / hr., nephrotic range proteinuria is prevalent (on a timed-sample) [7]. Hyperlipidemia is more common during the active phase of Nephrotic syndrome and reduces when proteinuria resolves. It raises the possibility of atherosclerosis developing later in life and leading to chronic kidney disease [8,9,10].

2. OBJECTIVES AND GOALS

The study aimed to investigate serum cholesterol, triglycerides, LDL (low density lipoprotein), VLDL (very low-density lipoprotein), and HDL (high density lipoprotein) levels in nephrotic syndrome at the onset and during remission in first episode and relapse cases, as well as the relationship between dyslipidemia persistence and severity and disease duration and relapse frequency.

3. METHOD

This hospital-based prospective study, which took place from July 2018 to July 2019, in the Department of Pediatrics, Government Medical College and attached group of hospitals in Kota, Rajasthan, India, covered 30 cases of children with nephrotic syndrome. The control group consisted of 30 youngsters who did not have any liver or kidney problems. This is the control group.

3.1 Criteria for Acceptance

Nephrotic syndrome affects all newborns and children.

3.2 Criteria for Exclusion

1. Hyperlipidemia in the family/infantile stroke
2. Hepatobiliary diseases, hepatitis, renal tubular acidosis, and chronic renal failure in the previous year.
3. Patients taking beta blockers, retinoic acid, HIV protease inhibitors, thiazide diuretics, or immunosuppressive medications.
4. Patients with storage diseases such as glycogen storage disease, Tay-Sachs's disease and Niemann-Pick disease.

4. RESULTS

Before steroid therapy, after one month of steroid therapy, and at the conclusion of therapy, 30 nephrotic syndrome cases were clinically assessed, with the following investigations done in each case: before steroid therapy, after one month of steroid therapy, and at the end of therapy.

1. Total cholesterol in the blood was determined using an enzyme technique. Cholesterol levels in the blood should be between1 50 and 250 mg/dl [7]. Phosphotungstate technique was used to measure serum HDL cholesterol. Cholesterol levels in normal HDL range from 30 to 70 mg/dl.

3. Serum LDL cholesterol: Using Friedewald's equation, LDL cholesterol can be determined if the number of Triglycerides is known [8]. Triglycerides in the serum were determined using an enzymatic colorimetric technique. Triglycerides in the Serum: 60-165 mg/dl in men 40-140 mg/dl in females [9]. Enzymatic technique was used to determine serum VLDL. Photometric technique was used to test serum albumin.3.5–5.0gm/dl is considered normal [11]. Urine Albumin: tested with a Lab U reader plus 2 machines using a urine albumin strip. There is systemic hyperlipidemia in nephrotic syndrome, according to our findings. The current study also reveals that towards the end of steroid therapy, blood cholesterol levels in the first episode of nephrotic syndrome return to normal. In cases of recurrence, however, cholesterol levels remain elevated, perhaps predisposing to the development of atherosclerosis and the progression of chronic renal failure. As a result, there is a justification for treatment. More prospective control trials in children are needed to assess the efficacy and safety of lipid-lowering medications. The total number of cases is thirty. There are a total of 30 controls in this study.

Table 1. Sex distribution of case and controlled

Sex		Case	Control	Total	Chi square P value
	Female	40.00%	46.67%	43.33%	0.028
	Male	60.00%	53.33%	56.67%	>0.05
Total		100.00%	100.00%	100.00%	

Table 2. Comparison of lipid profile between case and control: After treatment

Lipid profile	Case	Control	P Value
T.Cholesterol	196.23 ± 54.09	169.87 ± 17.27	0.014
TGL	166.8 ± 84.05	108.53 ± 23.57	0.0002
HDL	81.83 ± 14.51	66.23 ± 12.86	0.0001
VLDL	39.27 ± 17.41	27.7 ± 9.2	<0.001
LDL	82.77 ± 47.78	81.37 ± 21.4	0.652

Table 3. Comparison of Mean value of Lipid profile in cases

Lipid Profile	Before Treatment	During Treatment	After Treatment
	Mean ± Stdev		
T. Cholesterol	490.17 ± 145.87	281.83 ± 100.5	196.23 ± 54.09
P.Value		< 0.001	< 0.001
TGL	444.33 ± 278.43	266.37 ± 140.38	166.8 ± 84.05
P.Value		< 0.001	< 0.001
HDL	62.87 ± 14.55	70.13 ± 13.4	81.83 ± 14.51
P.Value		< 0.004	< 0.001
VLDL	85.43 ± 25.31	61.6 ± 25.35	39.27 ± 17.41
P.Value		< 0.001	< 0.001
LDL	332.17 ± 145.35	166.73 ± 88.53	82.77 ± 47.78
P.Value		< 0.001	< 0.001

Table 4. Distribution of deranged lipid profile according to duration of disease: Before treatment

Deranged lipid profile	10-12 week	13-15week	16-18 week	>18 week	P value
T.Cholesterol	100%	100%	100%	100%	-
TGL	100%	100%	87.50%	100%	0.416
HDL	55.56%	44.4%	37.50%	53.35%	0.203
VLDL	100%	100%	100%	100%	-
LDL	100%	100%	100%	100%	-

Table 5. Distribution of deranged lipid profile according to duration of disease: After treatment

Deranged lipid profile	10-12 week	13-15 week	16-18 week	>18 week	P value
T.Cholesterol	0.00%	0.0%	37.50%	75.00%	0.004
TGL	33.33%	0.0%	25.0%	100%	0.004
HDL	22.22%	11.11%	12.50%	75.00%	0.064
VLDL	11.11%	11.11%	37.50%	75.00%	0.058
LDL	22.22%	22.22%	37.50%	50.00%	0.683

Table 6. Comparison of deranged lipid profile with number of relapses: Before treatment

Lipid profile	No of relapses						P value
	1	2		1	2		1
T.Cholesterol	100%	100%	T. Cholesterol	100%	100%	T. Cholesterol	100%
TGL	100%	100%	TGL	100%	100%	TGL	100%
HDL	66.67%	33.33%	HDL	66.67%	33.33%	HDL	66.67%
VLDL	100%	100%	VLDL	100%	100%	VLDL	100%
LDL	100%	100%	LDL	100%	100%	LDL	100%

Table 7. Comparison of deranged lipid profile with number of relapses: After treatment

Lipid profile	No of relapses						P value
	1	2		1	2		1
T.Cholesterol	0%	33.33%	T.Cholesterol	0%	33.33%	T.Cholesterol	0%
TGL	0%	33.33%	TGL	0%	33.33%	TGL	0%
HDL	0%	11.11%	HDL	0%	11.11%	HDL	0%
VLDL	33.33%	66.67%	VLDL	33.33%	66.67%	VLDL	33.33%
LDL	66.67%	33.33%	LDL	66.67%	33.33%	LDL	66.67%

5. DISCUSSION

Chylomicrons, VLDL, LDL, and HDL are the four types of cholesterol. Thirty children with nephrotic syndrome, ranging in age from 0 to 18, and thirty healthy children with no liver or kidney disease were involved in the study. In our study, 80 percent of children under the age of ten were affected, and male children were affected 1.5 times more than female children.

In other research, the sex ratio ranged from 1.7 to 2.1.7

In acute phase (before treatment) there were no significant differences between the lipid abnormalities manifested by the relapser and first episode of nephrotic syndrome except TGL (P value < 0.013). However, in the remission phase with number of relapses, there were found elevated level of total cholesterol (P value- 0.0006), TGL (P value- 0.0471) and VLDL (P value-0.030) levels. Mahmud et al found that among the relapsers, mean blood cholesterol level was significantly higher than of non-relapse (P value <0.001).

There are numerous clinical consequences of dyslipidaemia in general, and in patients with nephrotic syndrome in particular. Dyslipidaemia can result in acceleration of atherosclerosis, as well as an increased risk of myocardial infarction or cerebrovascular accident (stroke). Furthermore, dyslipidaemia in nephrotic syndrome might have a causative role in the established increased risk of thrombosis associated with this disease. Dyslipidaemia is one of the dominant risk factors associated with atherothrombotic disorders. Atherosclerosis is usually accompanied by hyperreactive platelets that increase the risk of thrombosis, which is further exacerbated by dyslipidaemia. kidney disease. This progressive kidney disease might result from the development of glomerulosclerosis, owing to podocyte injury and/or mesangial cell proliferation, as well as from proximal tubular cell injury.

In our study, the mean blood cholesterol levels were 490.17 mg/dl, with a peak of 940 mg/dl in the acute phase. TGL was 444.33 milligrams per deciliter, VLDL was 85.43 milligrams per deciliter, LDL was 332.17 milligrams per deciliter, and HDL was 62.87 milligrams per deciliter. During treatment, there was a statistically significant difference between the case and control levels of total cholesterol (P value 0.0001), TGL (P value 0.0001), VLDL (P value 0.0001), and LDL (P value 0.0001), which were all raised in instances

of nephrotic syndrome except HDL values. Our findings are similar to those of Dnyansh et al, who found that the mean total cholesterol was 422.61 mg/dl and the highest value was 676 mg/dl, with mean TGL of 284.06 mg/dl, VLDL of 54.53 mg/dl, LDL of 319.10 mg/dl, and HDL of 45.56 mg/dl. 9 In a similar study, Banerjee et al found that the average total cholesterol was 341 mg/dl, with the highest number being 641 mg/dl [12,13]. Total cholesterol, TGL, VLDL, and HDL levels were all shown to be higher following therapy, with P values of 0.014, 0.0002, 0.001, and 0.001 correspondingly. After nephrotic syndrome treatment, HDL levels climbed considerably. Sokolovskaya IV et al. published a study that was identical to this one [14]. In contrast to our findings, HDL levels in nephrotic patients have been found to be low in Gherardi E. et al [15], normal in Vass VJ et al [16], and increased in Zilleruelo, et al. [16,15,17] After treatment, total cholesterol and TGL levels were found to be higher, with P values of 0.004 and 0.004 respectively, as the duration of disease increased. However, there was no discernible difference in LDL, VLDL, or HDL levels. However, there was no statistically significant difference in total cholesterol, VLDL, TGL, HDL, and LDL levels before and after treatment with increasing disease duration. Hypercholesterolemia (chi sq=5.090, P value=0.024) and hypertriglyceridemia (chi sq=10.22, P value=0.001) were linked to greater disease duration, according to A. Subasakthi et al. Many other investigations, on the other hand, found a substantial difference in all lipid fraction except HDL.16Except for TGL (P value 0.013), there were no significant differences between the lipid abnormalities shown by the relapser and the first episode of nephrotic syndrome in the acute phase (before therapy). However, there were higher levels of total cholesterol (P value-0.0006), TGL (P value-0.0471), and VLDL (P value-0.030) in the remission period with a high frequency of relapses. According to Mahmud et al, the mean blood cholesterol level of relapses was significantly greater than that of non-relapsers (P value 0.001). They came to the conclusion that serum cholesterol levels might be used to predict relapse in idiopathic nephrotic syndrome in children [18]. Our triglyceride levels were equivalent to those found in a study by Sitti Aizah Lawang et al (p0.035) [19,1,2,3]. However, there was no discernible difference in LDL and HDL levels. The following are some of the study's limitations: 1. Other aberrant lipids such as free fatty acids, phospholipids, and prostaglandins were not investigated. [7]. For normal lipid levels in Indian children, there is only one study available. When compared to a control group, HDL levels were shown to be higher in our study. This has to be looked at more. Conclusion: 1. In our study, total cholesterol (p value 0.0001), TGL (p value 0.0001), VLDL (p value 0.0001), and LDL (p value 0.0001) were all elevated in all cases of nephrotic syndrome compared to the control group during relapse / I episode, except HDL values, which began to decrease once remission was achieved [7]. When compared to the control group, HDL levels increased dramatically after nephrotic syndrome treatment [4]. Hypercholesterolemia (p value – 0.004) and hypertriglyceridemia (p value – 0.004) were significantly enhanced after nephrotic syndrome treatment, with disease duration increasing. There was an increase in total cholesterol (P value 0.006), TGL (p value 0.047), and VLDL (p value 0.030) levels following remission phase of nephrotic syndrome with the frequency of relapses in this study, but no significant variation in lipid fraction during disease activity [7]. Even after a long period of remission, frequent relapses have persistent hyperlipidemia. As a result, the severity of hyperlipidemia is related to the length of the disease and the f frequency of relapse.

6. CONCLUSION

During remission after a recent diagnosis of NS, lipid profiles recover to normal, but they are much higher in recurrence cases, even during remission. When compared to people who had just been diagnosed with NS, the rate of relapse was substantially higher in relapse cases. As a result, the need for treatment is justified. The current study shows that nephrotic syndrome is associated with widespread hyperlipidemia.

CONSENT

As per international standard, parental written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval from Institutional Ethical Committee (IEC) prior to the start of the research was taken.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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