

Study of Lipid Profile and Thyroid Function Abnormality In Children Of Nephrotic Syndrome

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Abstract

Background: Hypercholesterolemia and subclinical hypothyroidism were common problem in nephrotic syndrome. Monitoring of lipid profile to done not only in the diagnosis and also in relapse cases. Because in relapse cases serum cholesterol persistently elevated and predispose to the development of atherosclerosis. **Aims and Objectives:** To study the correlation between lipid and thyroid profile and different types of nephrotic syndrome in children between 1 to 12 years and also study the association between serum albumin with lipid profile and TSH. **Materials & Method:** 80 cases of different types of nephrotic syndrome included in our study that includes first episode, relapses, Steroid dependent nephrotic syndrome(SDNS), Steroid resistant nephrotic syndrome(SRNS) and in remission. Only one value is taken and its distribution in different types of nephrotic syndrome was analysed. **Results:** Males are affected more with mean age of presentation of 6.9 years. SRNS cases cholesterol level significantly elevated compared to other types. T3, T4 and TSH were within normal limit, negative correlation between albumin with cholesterol and TSH. **Conclusion:** Serum cholesterol should be monitored in relapse cases, because persistent elevation in relapse cases predispose to development of atherosclerosis. In SRNS cases cholesterol level was highly elevated and may require lipid lowering agents. No need of routine thyroid screening in a case of nephrotic syndrome.

Keywords: Nephrotic syndrome, Lipid profile, Thyroid function

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Introduction

Nephrotic syndrome is characterised by massive proteinuria(>40 mg/m²/hr or >1g/ m²/day or spot protein creatinine ratio of >2), will lead to hypoproteinemia (serum albumin <2.5 gm/dl), generalised edema and hyperlipidemia (serum cholesterol >200 mg /dl)[1]. 1-3 per 100000 children less than 16 years affected with nephrotic syndrome. Most of them affected with primary or idiopathic type. Minimal change disease is the most common idiopathic type. One of the characteristic feature of nephrotic syndrome is 80% of them respond to corticosteroid therapy[2]. In nephrotic syndrome there will be elevated serum lipids and cholesterol. During nephrosis there will be more loss of protein in urine this will lead to hypoalbuminemia. In addition to low serum albumin, more production of lipoproteins with impaired lipoprotein lipase activity will increase the lipoprotein level. Lipids are mainly transported by lipoproteins, so in nephrotic syndrome because of more lipoproteins there will be high serum cholesterol, LDL cholesterol, VLDL cholesterol and Triglycerides [3]. Thyroid hormones T3 and T4 binds with thyroid binding globulin, pre-albumin and albumin in circulation[3]. During nephrosis due to loss of albumin, thyroid binding globulin with T4 and other proteins in urine there will be decrease in serum level of thyroid hormones and stimulation of TSH production[4]. Because it is a treatable condition in all cases of nephrotic syndrome always investigate for hypothyroidism. In active disease that is in proteinuria phase there is

hypercholesterolemia and mild (or) subclinical hypothyroidism. During remission after completion of 6 weeks of steroids there will be normalisation of serum cholesterol and thyroid function, so if serum cholesterol level was high even during remission more risk for relapses. Serum albumin shows inverse relation with lipid profile and TSH. So more severe the hypoalbuminemia more will be serum cholesterol and TSH.[5]

Methods

This study was conducted in the Upgraded department of paediatrics, Patna Medical College & hospital, Patna. It was a cross sectional study done for the period of one year. Study group included all cases of nephrotic syndrome(which includes 1st episode, relapse, SDNS, SRNS and remission between age group of 1 to 12 years) with sample size of 80 cases.

Inclusion criteria

1. All cases of nephrotic syndrome between 1 to 12 years.
2. New and old cases which includes relapse, SDNS, SRNS and on remission.

Exclusion criteria

1. Children with family history of hyperlipidemia.
2. Children with previous history of thyroid dysfunction.
3. Children with other causes of hypoproteinemia like liver disease and malnutrition.
4. Age < 1 year and >12 years.

Methodology

Pre-structured proforma was used to record the information from the individual. After getting the consent from the parents, clinical data was collected and entered in the proforma, which includes age, sex, presenting complaints, drug history and type of nephrotic syndrome (1st episode/relapse/SDNS/SRNS/remission). After history taking and clinical examination, blood samples were collected from the patients for lipid profile and thyroid function. Enzymatic method used for

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measurement of serum cholesterol and VLDL; enzymatic calorimetric method used for measurement of LDL and triglycerides; phosphotungstate method for HDL and photometric method for measuring serum albumin. T3, T4 and TSH level measured By ELISA (Enzyme Linked Immunosorbent Assay).

Results

In our study cases are diagnosed and categorized in to different types and blood sample were collected within 48 hours of admission in our hospital and in 1st episode cases before starting steroids. Among remission cases sample taken after one month of daily steroids and 3 consecutive early morning samples negative for albumin.

Age of presentation: Most common age group 5-10 years (with 48 cases) followed by 1-5 years (24 cases) and 11-12 years (8 cases). Mean age of presentation is 6.9 years. Gender distribution: males (60%) affected more than females (40%). Common presentation:

Facial puffiness (80%) followed by decreased urine output (65%) and abdominal distension (45%). Distribution of various parameters: In the 80 cases included in our study mean serum albumin was low (mean =2.212 gm%) where as mean total cholesterol (mean = 344.300 mg/dl), mean triglycerides (304.025 mg/dl), mean LDL (mean=234.650 mg/dl) and VLDL (mean=61.625 mg/dl) were elevated but mean HDL (mean=48.150 mg/dl) within normal limit. Thyroid profile mean T3 (mean=0.923 ng/ml), mean T4 (mean=6.105 microg/dl) and mean TSH (mean=4.2925 iu/ml) all were normal. Serum albumin / Cholesterol (CH) / Triglyceride (TG) / Low Density Lipid (LDL) / Very Low Density Lipid (VLDL) / High Density Lipid (HDL) / T3/T4/TSH level in different type of nephrotic Gender distribution of serum CH / LDL / TG / TSH in all cases. Correlation between serum albumin with serum cholesterol and TSH: negative relation between serum albumin with serum cholesterol and TSH .

Table 1: Frequency of cases of nephrotic syndrome

Dignosis	No of cases	Percentage
First episode	38	47.5 %
Relapse	22	27.5 %
SDNS	06	07.5 %
SRNS	06	07.5 %
Remission	08	10.0 %
Total	80	100 %

Table 2: Distribution of Various Parameters

Various Parameters	Sex	Number	Mean
Age	Male	50	6.960
	Female	30	6.800
	Male +Female	80	6.900
Protein	Male	50	4.476
	Female	30	4.847
	Male+Female	80	4.615
Albumin	Male	50	2.136
	Female	30	2.340
	Male+Female	80	2.212
Cholesterol	Male	50	349.920
	Female	30	334.933
	Male+Female	80	344.300
TG	Male	50	312.000
	Female	30	290.733
	Male+Female	80	304.025
LDL	Male	50	238.800
	Female	30	227.733
	Male+Female	80	234.650
HDL	Male	50	47.760
	Female	30	48.800
	Male+Female	80	48.150
VLDL	Male	50	63.560
	Female	30	58.400
	Male+Female	80	61.625
T3	Male	50	0.888
	Female	30	0.980
	Male+Female	80	0.923
T4	Male	50	5.708
	Female	30	6.767
	Male+Female	80	6.105
TSH	Male	50	4.3384
	Female	30	4.2160
	Male+Female	80	4.2925

Table 3: Correlation between serum albumin with serum cholesterol and TSH

	Albumin level			Mean
	<1.5	1.6-2.0	2.1-2.5	
Cholesterol	393.0	389.4	338.6	364.3
TSH	6.6	5.2	3.7	4.5
Number	06	30	36	

Discussion

Age of onset:-In our study among 80 children between 1 to 12 years, most common age group of presentation is 6 to 10 yrs (48/80) followed by 1 to 5 years (24/80). Mean age of presentation is 6.9 yrs. In a study done by Indumati et al[1] among 20 cases of nephrotic syndrome 12 cases were between 1 to 4yrs, 5 cases were between 5 to 9 years and mean age of presentation was 5.85 years.[6] In our study among 80 cases 48 cases were male (60%) and 32 cases were female (40%). Study done by Imran gatto et al[5] among 208 cases 62.5% were males (130) and 37.5% were females (78). Common Presentation :-Among 80 cases of nephrotic syndrome 64 children presented with facial Puffiness (80%), 52 children presented with decreased urine output (65%) and 36 cases with abdominal distention (45%). Vidhi Sahni et al[6] in their study among 35 children of 1 to 8 years showed that most common presentation is facial puffiness (80%) followed by decreased urine output (62.85%) and by abdominal distention (31.42%)[7]. In the 80 cases included in our study mean total cholesterol(mean=344.300mg/dl), mean triglycerides (mean=304.025mg/dl), mean LDL(mean=234 .650 mg/ dl) and mean VLDL (mean=61.625 mg/dl) were elevated but mean HDL (mean=48.150 mg/dl) within normal limit. Dynase et al[7] done a study on serum lipids in nephrotic syndrome in 30 cases and 10 children were taken as control. They showed that there was high cholesterol, LDL, VLDL and triglycerides and the HDL level was normal. According to their study serum cholesterol in relapse cases were significantly higher than first episode. In steroid resistant cases serum cholesterol level highly elevated than steroid responsive cases . [8] They also told the rise in serum cholesterol less when compared to western studies.They noticed positive relation between serum cholesterol and LDL and negative relation between albumin and cholesterol.Arjie et al in their study showed that serum cholesterol level continuously elevated in frequent relapse cases. In our study serum cholesterol in relapse cases higher than 1st episode.In steroid resistant cases serum cholesterol significantly elevated compared to other types.LDL level compared to first episode and steroid dependent nephrotic syndrome significantly elevated in steroid resistant nephrotic syndrome.[9]Tsuchara et al showed that children with frequently relapsing nephrotic syndrome had high level of serum cholesterol even during remission. They also showed negative correlation between albumin with LDL and VLDL. In our study also showed negative correlation between serum albumin and serum cholesterol. Beck et al[10]in their study told that there is positive correlation between albumin and HDL and negative correlation between albumin and serum cholesterol. Indumati et al in their study negative correlation between albumin and cholesterol. They also showed inverse correlation between albumin and VLDL.[11]

5.Thyroid profile – In our study among 80 cases serum T3,T4 and TSH all within normal limit. But TSH value in first episode significantly higher than remission. VidhiSahni et al [12].in their study on hypothyroidism in nephrotic syndrome showed that T3 and T4 values normal both during active disease and in remission but TSH values were higher in active disease.During remission TSH become normal and producing a state of subclinical hypothyroidism in proteinuria stage that don't need treatment of thyroxine. They also explained negative correlation between albumin and TSH. U. Sawant et al in their study showed that nephrotic syndrome patient have an

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more risk of subclinical hypothyroidism. Thyroid profile becomes normal when the non-thyroid illness is resolved. Giles et al told that abnormalities in thyroid function were seen in patient with proteinuria stage, Specifically,TSH levels were higher in patients with active disease than with controls when there was proteinuria and hypoalbuminemia. Our study showed negative correlation between serum albumin and TSH.

Conclusion

1.Most common age group of presentation is 5 to 10 years 48 cases (60%), followed by 1 to 5 years 24 cases (30%), 11 to 12 years 8 cases (10%). Mean age of presentation 6.9 years. Males (60%) are affected more than females (40%) but no significant gender difference of all parameters.There is increased serum cholesterol (mean=344.30 mg/dl), LDL(mean=234.650mg/dl), VLDL (mean=61.625mg/dl), triglyceride (mean=304.025mg/dl) and normal or borderline HDL (mean=48.150 mg/dl). Serum cholesterol compared to first episode elevated in relapse cases. Serum cholesterol in SRNS cases shows significant elevation compared to other types. LDL values compared to first episode were elevated in relapse cases. LDL values in SRNS cases shows elevation compared to first episodes and SDNS cases. Serum T3, T4, TSH were found to be within normal limits but TSH values compared to remission elevated in first episode There is negative relation between serum albumin with cholesterol and TSH.

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