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"An estimation of Serum Albumin level in Childhood with Nephrotic Syndrome: A study in tertiary care hospital in Bangladesh"

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Abstract: *Nephrotic syndrome, or nephrosis, is defined by the presence of nephrotic-range proteinuria, edema, hyperlipidemia, and hypoalbuminemia. While nephrotic-range proteinuria in adults is characterized by protein excretion of 3.5 g or more per day but in children it is defined as protein excretion of more than 40 mg/m2/h or a first-morning urine protein/ creatinine of 2-3 mg/mg creatinine or greater. Prednisolone is a steroid medication used to treat certain types of allergies, inflammatory conditions, autoimmune disorders, and cancers, is very prevalent in children with nephrotic syndrome. The aim of this study was to evaluate the association between serum Prednisolone and serum albumin in childhood nephrotic syndrome. This prospective interventional study was done in the department of paediatric nephrology & kidney diseases, Dhaka Shishu (Children) Hospital, Sher - E - Bangla Nagar, Dhaka and Clinical Pharmacy & Pharmacology Dept. University of Dhaka from January 2013 to December 2013. Serum Prednisolone and serum albumin was measured by enzymatic colorimetric method. The relationship between serum Prednisolone and serum albumin was measured by Chi-square test and Paired't' test. Serum prednisolone was measured in nephrotic syndrome during active phase & in remission and the average values were 2.088795 mic. mol/ml & 2.175277 mic.mol/ml respectively which was significantly high in remission of NS. This was not done previously in our country. Serum albumin was also measured in this study, average s. albumin level during active phase & in remission were 9.339318 gm/L & 20.4907 gm/L respectively which was significantly high in remission of NS.*

Key words: *Nephrotic syndrome, hypoalbuminemia,, Serum Albumin*

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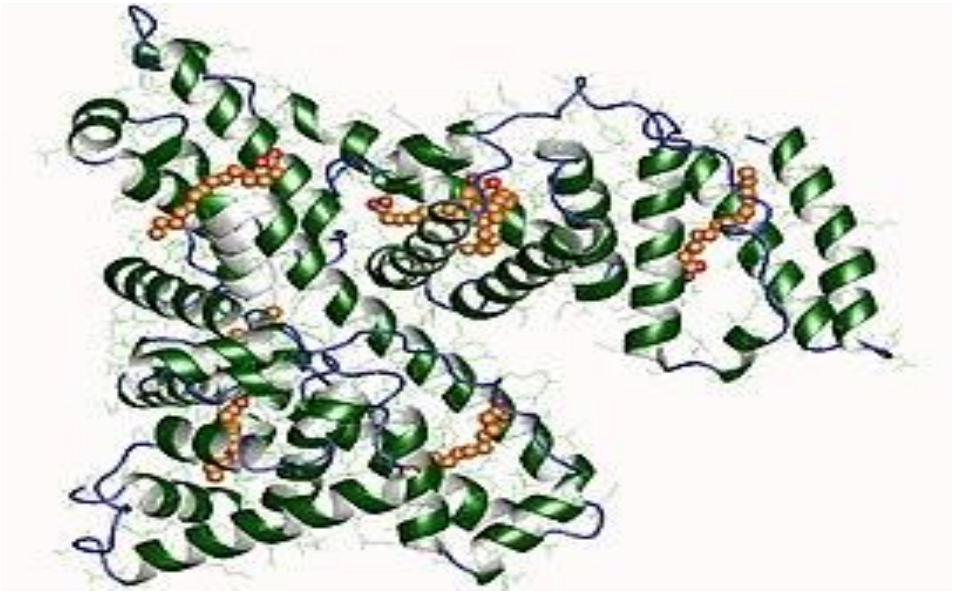
I. Introduction

Human serum albumin is the serum albumin found in human blood. It is the most abundant protein in human blood plasma; it constitutes about half of serum protein. It is produced in the liver[1]. It is soluble in water and monomeric. Proteins circulate throughout your blood to help your body maintain fluid balance. Albumin is a type of protein the liver makes. It's one of the most abundant proteins in your blood. You need a proper balance of albumin to keep fluid from leaking out of blood vessels. Albumin gives your body the proteins it needs to keep growing and repairing tissue. It also carries vital nutrients and hormones. A serum albumin test is a simple blood test that measures the amount of albumin in your blood. Having surgery, getting burned, or having an open wound raises your chances of having a low albumin level[2]. Nephrotic Syndrome is a disease primarily of Pediatric age group. The syndrome is characterized by heavy proteinuria > 40mg/ m^2/ h, hypoalbuminaemia < 2.5 gm /dl, edema and hyperlipidemia.



Source: Wikipedia

In a retrospective study of all children in Nelson R Mandela School of Medicine, the commonest cause of chronic kidney disease (stage 2-5) was Nephrotic Syndrome comprising 30.9% in children < 5 years old & 40.8% in > 5 years old.4. In Nephrotic syndrome, renal failure may develop in some percentage. 30-40 % steroid resistant minimal change disease develops end stage renal disease by 5 years[3].

Hypoalbuminaemia in children with the nephrotic syndrome is due to an increase in turnover of total body albumin, may be result of a combination of two factors: 1) an increase in the fractional rate of catabolism of albumin and 2) albuminuria.

In children with ascites & anasarca, the fractional rate of albumin catabolism and the renal loss of albumin both are greatly increased. The deficiencies of albumin seen in the Plasma of children with nephrotic syndrome are due to an increased fractional rate of catabolism in association with renal losses. In nephrotic syndrome with hypoalbuminaemia, patient may present with severe edema/anasarca, severe respiratory distress and with complications as immunocompromised.

Sometimes hospital stay of patients with nephritic syndrome become prolonged due to complications like huge ascites, anasarca, deep vein thrombosis, respiratory distress etc. Most of the Nephrotic syndrome patients are steroid responsive. Some response earlier, some take long duration and a few do not respond., Hypoalbuminaemia one of the cardinal feature of NS, causes edema, ascites, anasarca, severe respiratory distress and some co-morbidities. Sometimes albumin transfusion becomes eminent. Bioavailability of serum prednisolone will be low, when serum albumin is low, as serum prednisolone bound with protein in serum which causes delayed recovery of patient with nephritic syndrome. So Serum albumin needs to be measured during active phase and in remission to see relationship and their clinical outcome. Moreover, very liomited study was done in our country by measuring serum albumin level in nephrotic syndrome.

So, this study was done to measure serum albumin level in nephrotic syndrome during active phase and in remission and to observe their relationship with clinical outcome.

II. Objectives

General Objective:

1. to assess the serum albumin level in children with idiopathic nephrotic syndrome

Specific Objectives:

1. To estimate the serum albumin in children, Bangladesh
2. To know more about idiopathic nephrotic syndrome in children, Bangladesh

III. Mathod & Materials

This prospective interventional study was done in the department of paediatric nephrology & kidney diseases, Dhaka Shishu (Children) Hospital, Sher - E - Bangla Nagar, Dhaka and Clinical Pharmacy & Pharmacology Dept. University of Dhaka from January 2013 to December 2013. Fourty four diagnosed nephrotic syndrome patients admitted in Dhaka Shishu Hospital were purposively included in this study whose age, 1-8 years, steroid responder & Idiopathic nephrotic syndrome were included. NS patients, age < 1 years and > 8 years. Steroid dependent & resistant nephrotic syndromes were excluded. Prior to commencement of the

study ethical clearance was taken from the ethical clearance committee of BICH. Informed written consent from legal guardian was taken after proper counseling. Reassurance was given to the guardian regarding investigations.

First of all thorough history & elaborate clinical examination were noted on a questionnaire. Biochemical & other necessary investigations like CBC, Urine R/E, S. cholesterol, spot urine protein creatinine ratio, HBsAg, S. creatinine MT, USG of KUB, CXR, etc. were done. Two ml Blood was collected from the patient & centrifuged. Then Serum was collected & stored in refrigerator. Then serum Albumin was measured by chromatograph machine in active phase & in remission. S. albumin level was measured in the department of Biochemistry, Dhaka Shishu Hospital. Data were collected by using prescribed questionnaire, compiled and analyzed by using STRATA 12. Chi-square test and Paired't' test were used as the test for significance. P value of < 0.05 was considered statistically significant. The study followed some inclusion and exclusion criteria's. Inclusion criteria's are (1) Nephrotic syndrome age from 2 years to 8 years and (2) Child and parents were willing to give consent and blood sample. Exclusion criteria's are (1) Age less than 2 years and more than 8 years (2)Those who had taken blood/fresh frozen plasma/albumin transfusion (3) Patient with liver disease (4) Patient with severe malnutrition.

IV. Result

This study was a prospective interventional study. Serum Albumin levels were measured in nephrotic syndrome patients during active phase and in remission & their relationships with clinical outcome were seen. The results in this study are given below.

Table 1: Mean age of the study participants in year (n-44)

	Mean age	S.E	CI	
age	4.287356	0.180519	3.928497	4.646216

Mean age of patient was 4 years 3 months.

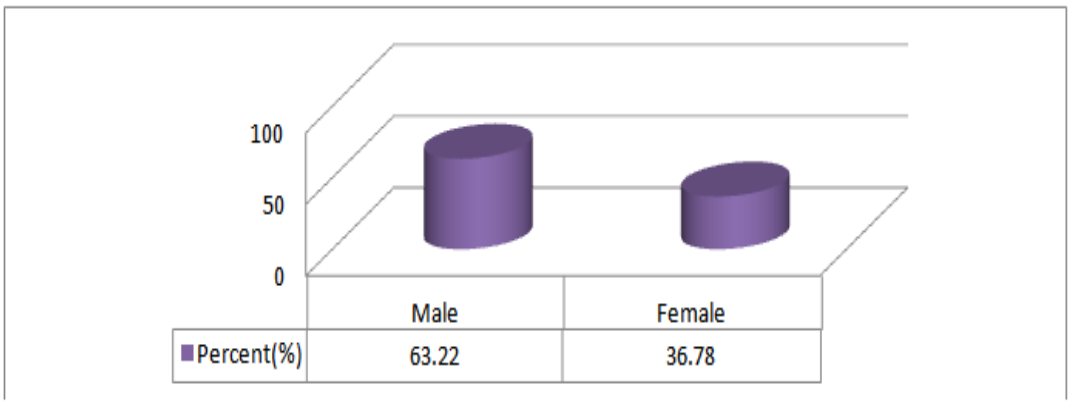


Figure 1: Sex distribution of the study participants (n=44)

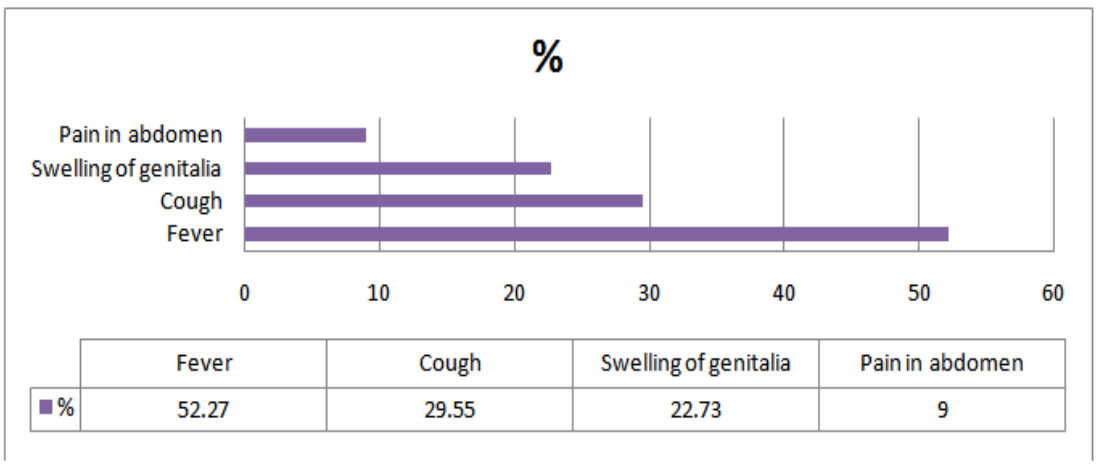


Figure 2: Signs & Symptoms of the study participants (n=44).

All patients presented with oedema, puffy face & ascites. Fever- 52.27%, cough - 29.55% , swelling of genitalia -22.73% and pain in abdomen - 9% among study participants.

Table 2: Distribution of signs & symptoms in remission among the study participants (n=44)

	Odema	Fever	swelling of genitalia	swelling of abdomen	pain in abdomen	cough	Puffy face
Present	0	0	0	0	0	0	0
Absent	43	43	43	43	43	43	43

All the patients in remission having no symptom like oedema, fever, swelling of genitalia, ascites, pain in abdomen, cough, puffy face etc.

Table 3: Serum Albumin level during active phase of NS and in remission (n=44)

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Active phase	44	9.339318	0.671417	4.453675	7.985277	10.69336
In remission	43	20.4907	1.177342	7.720348	18.11473	22.86667
combined	87	14.85092	0.900013	8.394765	13.06175	16.64009
difference		-11.1514	1.347467		-13.8305	-8.47225

Ho: diff = 0	t = -8.2758
Ha: diff != 0	P < 0.0000

Serum albumin is significantly high in remission (P value < 0.0000).

Table 4: Distribution of patients by relapse among study participants (n=44)

	no of patient	percentage	m.albumin in AP(gm/L)	m.albumin in Rem(gm/L)
NS 1st attack	16	36.36	9.43	22.49
NS 1st relapse	12	27.27	9.33	20.40
NS 2nd relapse	10	22.73	9.33	20.40
FRNS	6	13.64	9.28	16.48

Above table shows that 16 were 1st attack NS, 12 were 1st relapse NS, 10 were 2nd relapse NS and 6 were FRNS among 44 study participants.

V. Discussion

This study was done in the in the department of paediatric nephrology & kidney diseases, Dhaka Shishu (Children) Hospital, Sher - E - Bangla Nagar, Dhaka and Clinical Pharmacy & Pharmacology Dept. University of Dhaka from January 2013 to December 2013 . In this study, serum Albumin was measured in nephrotic syndrome during active phase & in remission and the average values were 2.088795 mic. mol/ml & 2.175277 mic.mol/ml respectively which was significantly high in remission of NS. Very little study was done previously in our country. Serum albumin was measured in this study, average s. albumin level during active phase & in remission was 9.339318 gm/L & 20.4907 gm/L respectively which was significantly high in remission of NS. Another study done by Jorge J et al 1997 showed that serum albumin was 19.04 gm/L In this study, 1st attack nephrotic syndrome was 36.36 %, 1st relapse nephrotic syndrome was 27.27 %, 2nd relapse nephrotic syndrome was 22.73 % and frequent relapse nephrotic syndrome was 13.64 %. Serum albumin levels were higher in 1st attack nephrotic syndrome than frequent relapse nephrotic syndrome. In age distribution, mean age of patient was 4 years 3 months and in sex distribution, male is predominant 63.22 %. Clinical presentation of cases: oedema, puffy face & ascites were present in all patients of nephrotic syndrome. Fever, cough, swelling of genitalia and pain in abdomen were present in 52.27 %, 29.55 %, 22.73 % and 9 % of cases respectively.

VI. Limitations

The study assessed Serum albumin level with Nephrotic Syndrome patients. But lower number of sample size and single study place making it as a weak study..

VII. Conclusion

Serum albumin was significantly increased in remission than active phase of Nephrotic Syndrome patients which ensures better clinical outcome of NS.

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