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"An estimation of Serum Prednisolone in Children with Nephrotic Syndrome: A study in a tertiary care hospital, Dhaka, Bangladesh"

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Abstract: *Poor absorption of prednisolone is very uncommon, but an absorption study may be useful confirmatory evidence of poor concordance in a patient who denies not taking Prednisolone. 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 children with nephrotic syndrome which is frequently used. The aim of this study was to estimate serum Prednisolone in children with nephrotic syndrome in active phase and in remission. This was an prospective observational study 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 2014 to December 2014. Serum Prednisolone was measured by enzymatic colorimetric method. The 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.*

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

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I. Introduction

Prednisolone is a part of a group of drugs called corticosteroids (often called "steroids"). Other steroid drugs include hydrocortisone, methylprednisolone etc. Prednisolone can be given in different ways, including tablet, injection, and inhaled form. It is usually given as a tablet when used after a kidney transplant, or for certain kidney disorders. Steroid drugs, such as prednisone, work by lowering the activity of the immune system. The immune system is our body's defense system. Steroids work by slowing our body's response to disease or injury. Prednisone is used to treat many different diseases like: 1) Lupus 2) Asthma 3) Rashes 4) Certain types of arthritis. Prednisone can also be used to manage other kidney disorders, including: a) Focal glomerulosclerosis (FSGS) b) Minimal change disease (MCD) c) IgA nephropathy.

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[1] Majority of affected children were steroid/prednisolone-sensitive minimal change disease. First-line drug for the treatment of idiopathic nephrotic syndrome is steroid/prednisolone therapy. [2] As hypoalbuminaemia is one of the cardinal features, measurement of serum albumin level is important.1 In children the most common presentation of glomerulonephritis is nephrotic syndrome. Histologically minimal change disease is the commonest 76.4%.[3]

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 InNephrotic syndrome, renal failure may develop in some percentage. 30-40 % steroid resistant minimal change disease develops end stage renal disease by 5 years.[5]

First-line drug in idiopathic nephrotic syndrome of childhood is prednisolone. The degree of therapeutic response and the side effects of prednisolone may show considerable inter individual variation

among patients receiving standard daily doses. This variability can be explained to some extent by differences in severity of the disease. The volume of distribution and the plasma clearance of prednisolone are abnormally high during the active phase of nephrotic syndrome but tend to decrease as the disease improves.[4] The protein binding of prednisolone is highly dependent on plasma protein levels which, in turn, are known to increase markedly within a few weeks of therapy in responsive patients.

Most of the Nephrotic syndrome patients are steroid responsive. Some response earlier, some take long duration and a few do not respond. Prednisolone is the drug of choice. Still it has some toxicity. 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 prednisolone& albumin needs to be measured during active phase and in remission to see relationship and their clinical outcome. Moreover, no study was done in our country by measuring serum prednisolone. So, this study was done to measure serum prednisolone level in nephrotic syndrome during active phase and in remission and to observe their relationship with clinical outcome.

II. Objectives

General Objective:

1. To estimate serum prednisolone level in children with idiopathic nephrotic syndrome.

Specific Objectives:

1. To know more about Serum Prednisolone level during active phase of NS.
2. To know more about Serum Prednisolone level during remission of NS.

III. Mathod & Materials

A prospective observational study was done in the department of PaediatricNephrology &Kidney diseases, Dhaka Shishu(Children) Hospital, Sher - E - Bangla Nagar, Dhaka and Clinical Pharmacy & Pharmacology Dept. University of Dhaka from January 2014 to December 2014. Fourty four diagnosed nephrotic syndrome patients admitted in Dhaka Shishu(Children) 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 Prednisolone were measured by chromatograph machine in active phase & in remission. S. Prednisolone was measured in the Dept. of Pharmacology, Dhaka University. 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. .

IV. Result

This study was a prospective interventional study. Serum Prednisolonewere 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)

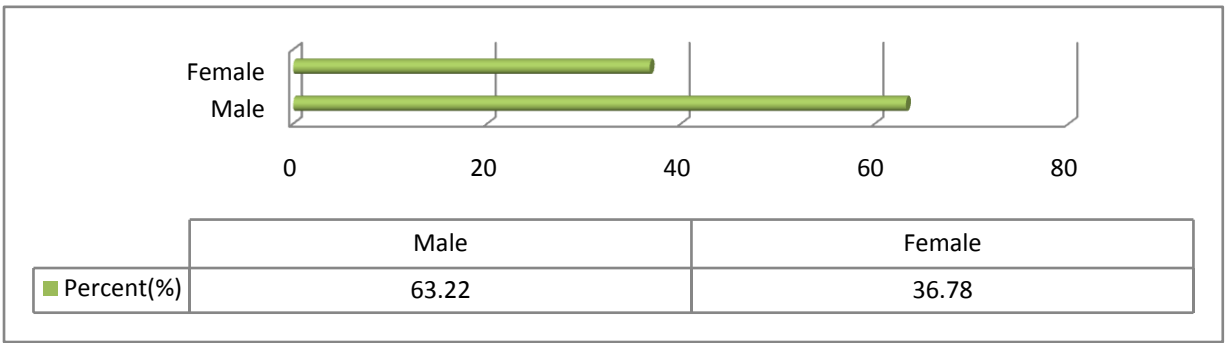
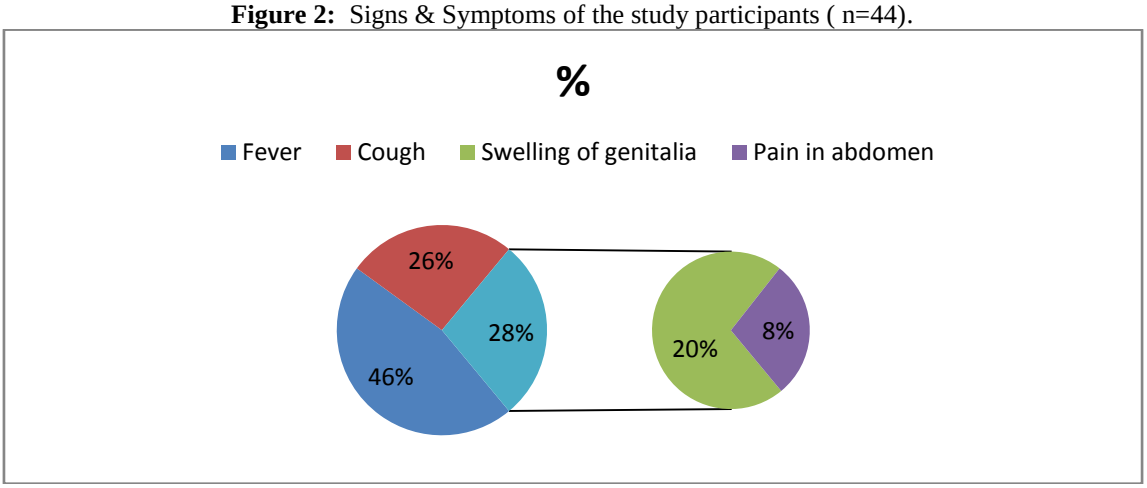


Table shows studies Male are a domination factors in the study about 63.22%

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 Prednisolone level during active phase of NS and in remission (n=44)

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Active phase	25	2.088795	0.008978	0.04489	2.070265	2.107324
In remission	16	2.175277	0.02928	0.117122	2.112868	2.237687
combined	41	2.122544	0.014123	0.090428	2.094001	2.151087
difference		-0.08648	0.030626		-0.15086	-0.0221

Ho: diff = 0	t = -2.8238
Ha: diff != 0	P= 0.0113

Serum prednisolone level is significantly high in remission (P value = 0.0113).

V. Discussion

This study was done in the in the department of PaediatricNephrology &Kidney diseases, Dhaka Shishu (Children) Hospital, Sher - E - Bangla Nagar, Dhaka and Clinical Pharmacy & Pharmacology Dept. University of Dhaka from January 2014 to December 2014 . In this study, 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 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. So serum prednisolone has direct relation with serum albumin that is serum prednisolone increases when serum albumin is increased. 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 prednisolone & 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. All the signs & symptoms were absent in remission of nephrotic syndrome.

VI. Limitations o the study

The study showed a positive association between serum prednisolone and serum albumin. However, this study was done with lower number of samples and in a single centre.

VII. Conclusion

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

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