

## Growth Parameters and Growth Hormone Levels in Children with Nephrotic Syndrome

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### Abstract:

**Aims and Objectives:** Nephrotic syndrome is a common renal disorder seen in pediatric population. Proteinuria is the hallmark of this disorder. Corticosteroids form the mainstay of treatment for nephrotic syndrome. Growth retardation is likely in nephrotic syndrome either due to the disease or due to the corticosteroid therapy. So, the present study was undertaken to assess the growth parameters and the growth hormone levels in children with nephrotic syndrome.

**Methodology:** Forty cases of nephrotic syndrome and thirty seven age and sex matched controls were included in the study. The growth parameters were measured and serum growth hormone levels were estimated in them by using enzyme linked immunosorbent assay (ELISA).

**Results:** The weight and height of the cases were significantly less when compared to the controls. There was no significant difference in the body mass index (BMI), mid arm circumference and upper segment- lower segment ratio between the two groups. The growth hormone levels were significantly higher among the cases when compared to the controls. After one month of treatment, there was a significant increase in the height and decrease in body mass index of the cases

**Conclusion:** Our conclusion is that the growth parameters are altered and the serum growth hormone levels are increased in children with nephrotic syndrome.

**Keywords:** Nephrotic Syndrome, Growth Hormone, ELISA.

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### Introduction

Nephrotic syndrome is a common renal disorder seen in paediatric population. It is characterized by massive proteinuria, hypoalbuminemia, edema and hyperlipidemia [1]

The most common form of nephrotic syndrome in children is idiopathic and includes minimal change disease, focal segmental glomerulosclerosis and mesangial proliferative glomerulopathy. Of these varieties, minimal change disease accounts for the most of the cases (85%). Secondary causes of nephrotic syndrome include amyloidosis, Henoch Schonlein purpura, systemic lupus erythematosus, diabetes mellitus, certain infections and malignancies. These causes are rare in children.[2]

Nephrotic syndrome occurs in children in the period when the growth rate is steady [3]. Proteinuria is the hallmark of the disease. In addition, corticosteroids are the major group of drugs used in the treatment of nephrotic syndrome. Thus, disturbances in growth is very much likely in

nephrotic syndrome either due to the disease or due to the corticosteroid therapy. So, the present study was undertaken to assess the growth parameters and the growth hormone levels in children with nephrotic syndrome.

### Materials and Methods

The study involved 40 cases of nephrotic syndrome who were admitted in the paediatric ward of Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER). These were in the age group of 3 -12 years. Children with comorbid illness such as tuberculosis and epilepsy were excluded. Thirty seven patients who attended the pediatrics OPD with minor ailments such as gastritis, headache, respiratory tract infections were taken as controls. They were matched according to age and sex. The ethical clearance for the study was obtained from the Institute Ethics Committee. A written informed consent was obtained from the parents of both cases and controls. On admission of

the cases in the pediatric ward, history was taken and physical examination was done. The anthropometric parameters i.e. body weight, height, body mass index, mid arm circumference and upper segment- lower segment ratio were assessed. Five ml of fasting blood was taken. Serum was separated and stored at - 40 degree Celsius for analysis of growth hormone. Assessment of anthropometric parameters was also done after one month, when the patients came for follow up.

Growth hormone levels were estimated in the serum samples by Enzyme linked immunosorbent assay (ELISA).

### Statistical analysis

Data was analysed using the SPSS software version 13 for windows. Results were expressed as mean± standard deviation. For the comparison of data between the groups, students t test and Mann Whitney test were used as appropriate.

A P value of less than 0.05 was considered as significant.

### Results

**Table 1: General Characteristics of the Study Subjects**

Parameter	Controls	Cases	p value
Number	37	40	-
Age	8.32±2.54	7.93±2.76	0.51
Sex (M/F)	21/16	20/20	-

The general characteristics of the study subjects are shown in Table 1

**Table 2: Comparison of Growth Parameters Among the Controls and Cases**

Parameter	Controls	Cases	P value
Weight (kg)	25.89±6.56	22.63±5.79	0.024
Height (cm)	126.59±13.97	117.43±14.5	0.006
BMI (kg/m <sup>2</sup> )	15.87±1.50	16.25±2.16	0.379
MAC (cm)	16.59±1.51	16.75±2.18	0.706
Upper segment: Lower segment	0.99±0.08	1.02±0.08	0.118

Table 2 shows the comparison of growth parameters among the cases and controls.

The cases had significantly lower weight and height when compared to the controls. There was no significant difference in body mass index, mid arm circumference and upper segment- lower segment ratio between the cases and controls

**Table 3: Comparison of Growth Hormone Levels between the Controls and Cases**

Parameter	Controls	Cases	P value
Growth hormone (ng/mL)	2.21±2.71	3.91±3.61	0.008

Table 3 compares the growth hormone levels between the two groups. Growth hormone levels were significantly higher in cases

**Table 4: Comparison of Growth Parameters in Cases on Admission and After One Month of Treatment**

Parameter	On admission (n=40)	After one month (n=33)	P value
Weight (kg)	22.63±5.79	21.32±5.35	0.416
Height (cm)	117.43±14.51	120.2±12.9	0.047
BMI (kg/m <sup>2</sup> )	16.25±2.16	14.54±1.98	0.013
MAC (cm)	16.75±2.18	16.7±1.97	0.514
Upper segment: Lower segment	1.02±0.08	1.02±0.08	0.411

After one month of treatment, there was a significant increase in height and the body mass index was significantly decreased. This is shown in Table 4

### Discussion

According to our study, the cases have significantly lower weight and height compared to the controls. This points towards growth retardation in children with nephrotic syndrome. This is consistent with findings of other studies. [4,5]

Due to massive proteinuria, the patients of nephrotic syndrome are in a state of negative nitrogen balance. There is also an increased catabolism of proteins in these patients resulting in protein malnutrition and affecting growth. Scharer

et al [6] studied growth in 45 children with nephrotic syndrome.

They found that hypoproteinemia is an independent significant factor contributing to growth retardation in patients with steroid resistant nephrotic syndrome. Other factors affecting growth in children with nephrotic syndrome are altered calcium and vitamin D metabolism [7], loss of thyroid hormones in urine [8] and frequent infections.[9]

On assessment of growth hormone levels, we found that the growth hormone levels are significantly higher in cases, when compared to the controls. This could be explained by increased urinary losses of insulin like growth factors (IGFs) in children with nephrotic syndrome [10,11] Consequently, the negative feedback of insulin like growth factor-1(IGF-1) on growth hormone secretion [12,13] is decreased. This results in increased growth hormone levels in these children.

One month after treatment, there is slight but significant increase in the height of the children with nephrotic syndrome. This might be because of increased growth hormone levels leading to increased catch-up growth among these children. Growth hormone acts on the growth plate and osteoblasts directly to promote linear growth. [14]

### Conclusion

This study shows that growth parameters are altered and growth hormone levels are increased in children with nephrotic syndrome.

However, prospective studies involving more children with follow up are needed to confirm the findings.

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