

# Study of Short Stature in Children with Special Reference to Etiology and Management: An Hospital Based Study

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## ABSTRACT

**Background:** Short stature is a common problem in children globally, especially in developing countries. Idiopathic Short Stature (ISS) is considered when no causative disorder can be identified. The aim of this study is to find out the etiological profile of short stature, its management and the effect of intervention on stature.

**Materials & Methods:** This is a hospital based prospective study done on all indoor patients with age 2 months to 2 years. Patients with inadequate follow up and Neonates and infants < 2 months were excluded in our study. All children with age < 12 years if they presented with height < 3rd percentile for age.

**Results:** Out of 2600, 260 cases of short stature. So the incidence of short stature in the present study was 10%. Maximum incidence of short stature is found to be among the age group of 1-5 years which is 51.9%. Male: Female ratio was 0.95. Bone age was normal (equal to chronological age) in 32.6% of patients, while it was abnormal (<chronological age) in 67.4% patients. Incidence of proportionate short stature in this study is 88% and disproportionate is 12%. In etiological profile of short stature Pathological (65%) is more common than Physiological (35 %). In Physiological short stature

category, among admitted patients- Constitutional (63.4%) is more common than familial (36.6%).

**Conclusion:** We concluded that incidence of short stature was 10%, mostly occurred in 1-5 years of age and etiological profile of short stature Pathological (65%) is more common than Physiological (35%).

**Keywords:** Short Stature, Etiology, Growth, Physiological.

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## INTRODUCTION

Short stature is a common problem in children globally, especially in developing countries. When compared with well-nourished and genetically relevant population, short stature is defined as height or length below 3rd percentile for that age and gender. Statistically, this refers to children who are shorter than 97% of their age and gender matched peers.<sup>1</sup>

Although a small body size can simply be within the normal ranges, it may also indicate various possible medical conditions. Causes of short stature are diverse, it may be genetic, metabolic, chronic systemic illness or simple environmental issues such as reduced food availability.<sup>1</sup>

Almost any chronic disease can cause short stature such as renal disease, malignancy, pulmonary disease, Cystic Fibrosis (CF), cardiac disease etc. Coeliac disease is a prime example of a remediable cause of short stature, especially in younger children.<sup>2</sup>

Nutritional deprivation and therapies like glucocorticoids, chemotherapeutic drugs, radiotherapy can result in short stature. Common endocrinological causes of short stature include hypothyroidism, hypopituitarism (isolated GHD or multiple anterior pituitary hormone deficiencies), hypercortisolism and classical Laron syndrome. All these are characterized by being overweight-for-height.<sup>2</sup> Short stature may also be seen with severe Intrauterine Growth Retardation (IUGR) or children born Small for Gestational Age (SGA) and in large number of dysmorphic syndromes. Idiopathic Short Stature (ISS) is considered when no causative disorder can be identified. Any body change or abnormality needs prompt professional medical advice for medical investigation and diagnosis.<sup>3</sup> The aim of this study is to find out the etiological profile of short stature, its management and the effect of intervention on stature.

## MATERIALS & METHODS

This is a hospital based prospective study done on all indoor patients with age 2 months to 2 years. Patients with inadequate follow up and Neonates and infants < 2 months were excluded in our study.

### Selection Criteria for Short Stature in Children

All children with age < 12 years if they presented with height < 3rd percentile for age on: National Centre for Health Statistics-Centre for Disease Control (2 yr. to 12 yr.) growth curve. World Health Organisation (2 months to 2 yr.) curves are chosen as reference.

### Anthropometry

Height measurement is performed with child standing erect without shoes with heels together, arms resting at the side of the

body, heels buttocks occiput touching the wall and head positioned in the Frankfurt plane (>2 Years) by Stadiometer.

Length measurement is performed with the child lying supine (2 months – 2 years) by Infantometer<sup>4</sup>. Upper segment (sitting height) / lower segment is taken for all patients.

Weight performed on electronic machine.

Nutritional evaluation of patients < 5 years, weight / height < -2SD were considered as malnourished according to World Health Organisation criteria.

For patients >5 years, BMI is calculated and those with BMI <5 pc were considered as malnourished according to Center for Disease Control criteria & graph.

Table 1: Age & Sex- Wise Distribution

| Age        | Male  | Female | No. | Percentage |
|------------|-------|--------|-----|------------|
| 2M –1Y     | 7     | 8      | 15  | 5.7%       |
| 1Y – 5Y    | 65    | 70     | 135 | 51.9%      |
| 5Y-9Y      | 38    | 32     | 70  | 26.9%      |
| 9Y-12Y     | 17    | 23     | 40  | 15.5%      |
| Total      | 127   | 133    | 260 | -          |
| Percentage | 48.8% | 51.2%  | -   | 100%       |

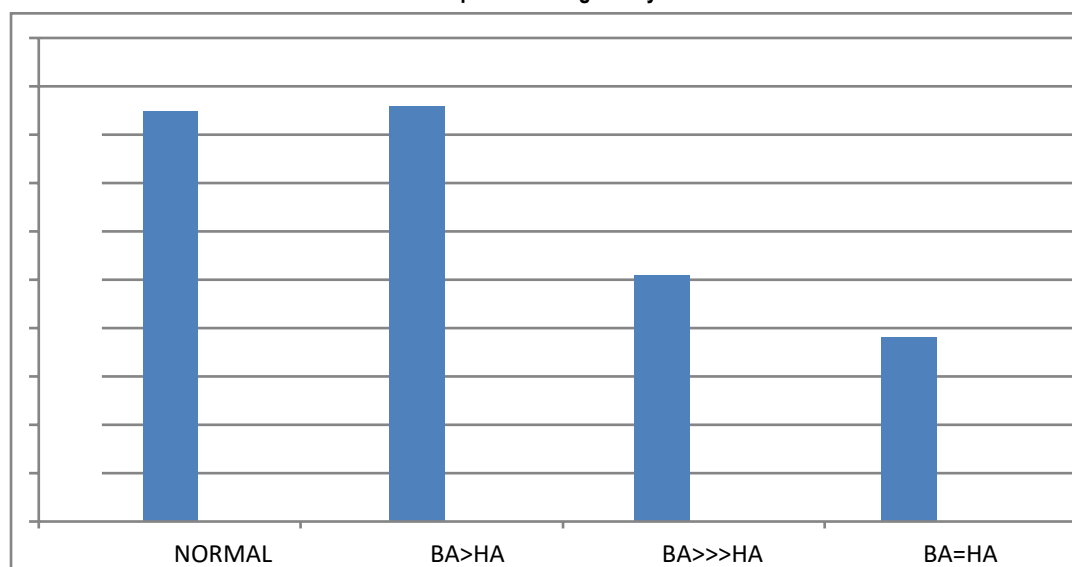
Table 2: Etiological Profile:

| Etiology                |                              | Number | Percentage |
|-------------------------|------------------------------|--------|------------|
| Physiological<br>(N=90) | Constitutional short stature | 52     | 63.4%      |
|                         | Familial                     | 38     | 36.6%      |
| Pathological<br>(N=170) | Respiratory system           | 27     | 10.3%      |
|                         | Cardiovascular system        | 21     | 8.1%       |
|                         | Renal system                 | 17     | 6.6%       |
|                         | Hematological system         | 71     | 27.3%      |
|                         | Genetic syndrome             | 15     | 5.7%       |
|                         | Endocrine system             | 15     | 5.7%       |
|                         | Gastrointestinal system      | 6      | 2.4%       |
|                         | Orthopedic disorder          | 8      | 3%         |
|                         | Metabolic disorders          | 19     | 7.4%       |
|                         | Central nervous system       | 14     | 5.3%       |

Table 3: Short Stature Type:

|                  |          |
|------------------|----------|
| Proportionate    | 230(88%) |
| Disproportionate | 30(12%)  |

Graph 1: Bone age analysis-



## RESULTS

Total admissions during study period was 2600 cases. Out of 2600, 260 cases of short stature. So the incidence of short stature in the present study was 10%. Maximum incidence of short stature is found to be among the age group of 1-5 years which is 51.9%. Male: Female ratio was 0.95 (table 1).

In etiological profile of short stature Pathological (65%) is more common than Physiological (35%). In Physiological short stature category, among admitted patients- Constitutional (63.4%) is more common than familial (36.6%). In Pathological short stature category, incidences among admitted patients are as follows- Malnutrition (16.5%), respiratory system (10.3%), cardiovascular system (8.1%), renal system (6.6%), endocrinological (5.7%), haematological (27.3%), Metabolic disorders (7.4%) and Genetic syndromes (5.7%) (table 2).

Bone age was normal (equal to chronological age) in 32.6% of patients, while it was abnormal (<chronological age) in 67.4% patients (figure 1). Incidence of proportionate short stature in this study is 88% and disproportionate is 12% (table 3). Patients of physiological short stature have low growth velocity but in their target range. Patients of pathological short stature category, Early recognition of growth abnormality and early intervention maintains adequate growth velocity.

## DISCUSSION

In the present study the incidence of short stature among total hospital admissions is 10%. A study done by Colaco et al<sup>5</sup>, incidence of short stature was 5.6% and Khadgawat et al<sup>6</sup> found incidence of short stature among total hospital admissions was 7%. In the present study, the incidence of short stature in male:female is 0.95. Chowdhury SP et al<sup>7</sup> found was 0.80 and Sultan M et al<sup>8</sup> observed 1.03 male to female ratio.

The incidence of short stature was maximum in 1-5 yrs which is 54%, which was compatible with Sultan M et al<sup>8</sup> found 43.5%.

In etiological profile of short stature Pathological (65%) is more common than Physiological (35%). Various study done by Sultan M et al<sup>8</sup>, Garg P<sup>9</sup> and Chowdhury SP et al<sup>45</sup> found the percentage of pathological short stature (62% 75% & 82% respectively) is greater than physiological (38%, 25% & 18% respectively).

As per this study, the incidence of constitutional short stature (22%) is greater than familial (12.7%). Moayeri et al<sup>10</sup> showed that the incidence of constitutional short stature (22%) is greater than familial (14%).

The incidence of short stature in the present study with patients of malnutrition is 16.5% and in the study done by Sultan M et al<sup>8</sup> is 9.8%. The difference can be attributed to higher rate of admission of patients of low socio-economic level with greater occurrence of malnutrition among them in our tertiary care centre. The incidence of chronic anemia in the present study is 17.3% as this tertiary care centre holds thalassemia clinics which explains the difference with the study by Sultan M et al<sup>8</sup> where incidence is 1.9%.

In the present study, the incidence of proportionate short stature is 88 & disproportionate is 12%. Chowdhury SP et al<sup>45</sup> found the incidence of proportionate short stature is 48 & disproportionate is 52%.

In this study, inadequate growth velocity was found among asthma patients with poor control which is similar to study done by Mc Cowan 1998<sup>1</sup> which showed decreased growth velocity in

patients with high dose steroids and requiring frequent hospital visits.

Among pts. of acyanotic CHDs control of heart failure & proper nutrition have adequate GV. While pts. of cyanotic CHDs have invariably poor GV except after TGA surgical correction. In the study done by Soliman AT<sup>11</sup> size of L-R shunt, hemodynamics, hypermetabolic state are all factors determining growth velocity with normal growth velocity by control of heart failure.

## CONCLUSION

We concluded that incidence of short stature was 10%, mostly occurred in 1-5 years of age and etiological profile of short stature Pathological (65%) is more common than Physiological (35%).

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