Short stature in Indian children: Experience from a community level hospital

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Abstract

Objective To study prevalence and aetiological profile of short stature in children attending outpatients department (OPD) of a community level hospital.

Method Six hundred and twenty five consecutive children (>2 and <16 years) attending OPD of a community level hospital, catering mostly to rural and lower socioeconomic strata of society, were screened for short stature using NCHS charts of mean and standard deviations. A diagnosis of familial short stature was made after allowing for mid-parental stature. Prepubescent children were classified as short stature using percentile charts (<5th centile being taken as short stature) for affluent Indian children. All children were followed up for 6-12 months to establish growth velocity. To allow for onset of puberty and stage, Tanners chart for early (+ 2SD) and late (- 2SD) maturers was considered.

Results Eighty six children were identified as having short stature on first visit. Commonest cause of short stature was protein energy malnutrition (PEM) & chronic diseases occurring in 46 (53.5%) cases. Other causes included normal variant short stature (24.4%), endocrine problems (4.7%) and miscellaneous (5.8%). 11.6% could not be classified due to loss to follow up and inability to refer to tertiary centres. Overall prevalence of short stature was 13.8%, significantly higher than prevalence reported from tertiary centres ($p<0.05$).

Conclusion Prevalence of short stature is higher than previously reported. A large number of children with short stature may go undiagnosed in rural and lower socioeconomic strata of developing countries. Prevalence and aetiological profile of children with short stature in present study is more representative of community than previous studies in India.

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Introduction

Stature is one of the most important determinants of personality in either sex. Several factors such as sex, race, prenatal and postnatal stature and hormones like growth hormone, thyroid hormone, insulin and sex hormones play an important role in short stature. Most studies on children of short stature in India are from tertiary level centres[1,2,3]. In India, the vast population, absence of proper referral system at primary and secondary health care levels and absence of coordination between public and private sectors of health care may result in the diagnosis being missed in many children with short stature. Aetiological profile and prevalence of short stature at community level hospitals may differ from those reported from tertiary centres. Present study was planned to study prevalence and profile of children with short stature and focus on problems in managing them at a community level hospital.

Method

Six hundred and twenty five consecutive children, (>2 but <16 years of age), attending paediatric OPD of Shanti-Mangalick hospital (150-bedded trust hospital providing care at low cost), Agra, India were screened for short stature. Criteria for diagnosis of short stature were:

1. Height >3 SD below mean for chronological age using NCHS mean and standard deviations chart[4].

2. Growth rate <5th percentile for chronological age using Agarwal growth chart for prepubescent children[5,6].

3. Height >2 SD below mean for chronological age for mid parental height and correlated using recommended method of evaluation for ascertaining familial short stature[7].

A detailed history focusing on nutritional and chronic diseases and endocrinal disorders and a complete physical examination including anthropometries data, mid-parental height, arm span and any dysmorphic features were recorded. Skeletal survey for bone age,

complete blood count, urea, electrolytes, serum creatinine, serum phosphorous, alkaline-phosphatase, x-ray skull and hormonal assays were planned and suggested to parents. Children were followed up for 6-12 months to calculate growth velocity and identify constitutional short stature for children achieving normal growth velocity on Tanner's height velocity curves[8]. Worm infestations and giardiasis were ascertained as cause of short stature by identifying catch up growth after de-worming and appropriate treatment. (Worm infestation was corroborative diagnosis in children with definite history. of passing worms or demonstration of ova on stool examination).

Results

86 (13.8%) children were identified as having short stature. The population characteristics of these children are shown in table 1.

Table 1
Population characteristics

Age groups (Years)	No. of Males (%)	No. of Females (%)	Total No. (%)
2-5	21(24.4)	16(18.6)	37(43.0)
5-7	11(12.8)	11(12.8)	22(25.6)
7-13	11(12.8)	11(12.8)	22(25.6)
> 13	03(03.5)	02(02.3)	05(05.8)

66 children were-prepubescent while 20 were in various stages of puberty (6 SMR I, 5 SMR II, 4 SMR III, 5 SMR IV) 12 were late maturers, 6 were average and 2 were early. maturers.

The aetiological profile of the 86 children is shown in table 2. 10 (11.6%) children who were identified as short stature on first visit, could not be classified as they were lost to follow up or parents were not available to ascertain familial short stature

Table 2
Aetiological profile of short stature in present study

S. No	Aetiology (N=86)	Total No.(%)
1.	**Malnutrition (PEM) & chronic diseases**	46 (53.5)
	Severe pulmonary TB	08
	Severe Extra pulmonary TB	13
	Giardiasis & worm infestations	07
	Stunted & wasted (PEM)	10
	Rheumatic heart disease (CHF)	03
	Chronic renal failure (CRF)	02
	Coeliac disease	05
2.	**Normal variant**	21 (24.4)
	Constitutional growth delay	06
	Familial short stature	15
3.	**Endocrine causes**	04(4.7)
	Growth hormone deficiency	02
	Diabetes mellitus	01
	Hypothyroidism	01
4.	**Miscellaneous**	05(5.8)
	Downs syndrome	02
	Klippel-fiel syndrome	01
	Apert syndrome	01
	Russell silver syndrome	01
5.	**Cannot be classified**	10 (11.6)
	(Missed diagnosis/ Loss to follow up)	

Discussion

Prevalence of short stature in the present study was 13.8%. Colaco et al. have reported a prevalence of 5.6% in children admitted in hospitals[2]. Khadgawat et al have reported 7% prevalence among 280 normal school children[3]. The difference in prevalence of short stature in present study is statistically different from that of Khadgawat and Colaco ($p<0.05\%$). However Colaco has also found a prevalence of 10% in children utilizing outpatient services[2]. Prevalence in present study was different from these findings too ($p<0.05$). The higher prevalence in present study is expected as the hospital caters mostly to the under-privileged sections of society. Also a higher prevalence in studies from OPDs is expected as most children with chronic diseases and short stature are managed in OPDs rather than being admitted in developing countries. One may argue that a higher percentage of short stature may be due to use of NCHS charts in present study but this assumption may not be true as Indian affluent children (under five) are at par with the developed world[5]. There is, however divergence between NCHS growth pattern and growth pattern of Indian children in late adolescence[10]. But number of children in late adolescence is very small in present study as to significantly alter the results. Aetiological profile of short stature was different in present study. Commonest cause of short stature was PEM & chronic diseases, occurring in 46 (53.5%) cases. This is much more than previously reported[1,2,3]. Most children in puberty were late maturers due to malnutrition which is contrary to situation in the developed world[10]. Malnutrition in children continues to cripple Indian society due to poverty, ignorance and illiteracy[11]. Agra (city of Taj Mahal) is a region of very high environmental exposure to mycobacterial diseases[11]. We thus had many children (24.4%) with severe pulmonary and extra-pulmonary tuberculosis accounting for failure to thrive and short stature. Other chronic diseases included giardiasis and worm infestations due to overcrowding and unhygienic conditions prevailing in the region. Coeliac disease was diagnosed on basis of raised tissue trans-glutaminase levels and documented catch up growth on gluten free diet. Upper gastrointestinal endoscopies could not be done due to financial restraints and unwillingness of parents for referral. Normal variant short stature accounted for 24.4% cases. Some cases of normal variant short stature may have been missed, as parents were not available to ascertain familial short stature during first visit and subsequently were lost to follow up. As expected, prevalence of endocrine causes was much less (4.7%) in present study than reported from tertiary care centres (up to 56.8%)[12]. Hormonal assays were not routinely done at this hospital but a private laboratory was linked for study purposes. Though prevalence from a hospital based study cannot be extrapolated for the community as a whole, aetiological profile and prevalence of short stature in present study is more representative of the community in a developing country. Several children were lost to follow up missing the diagnosis in many children of short stature. A large number of children with short stature may thus go undiagnosed in the rural and lower socioeconomic societies of the developing countries.

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