

TO COMPARE THE GROWTH IN VARIOUS ETIOLOGICAL FACTORS LEADING TO SHORT STATURE IN THE PAEDIATRIC POPULATION IN THE AGE GROUP BETWEEN 1-15 YEARS.

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Abstract

Background & Method: Growth is a continuous biological process subject to genetic, environmental, nutritional and hormonal influences. Altered growth potential may result from disturbance of any of these factors. Short stature, a common problem in the child population of developing countries. The present study was carried out in RKDF Medical College and Research Centre, Bhopal, M.P. This is a Prospective Cross Sectional study performed on All Children (Age 1-15 Years) Presenting to Out Patient Department. 151 cases were found to have short stature. These children were further evaluated for short stature.

Result: Type of short stature Proportionate short stature is more common (92.7 %) than disproportionate short stature (7.3%) in our study. Shows etiology wise distribution of proportionate short stature, Systemic disease leads the table with 45 %, followed by normal variant 37 %, endocrinal cause 15.8 % and genetic 2%. Chi square test revealed p value of 0.254 (<0.05) which is not significant. Shows various etiology of disproportionate short stature. Skeletal deformity due to rickets is most common being 55% followed by achondroplasia 27 %, TB spine 1 child (9%) and perthes disease 1 Child (9 %).

Conclusion: It is important to use appropriate growth charts and monitor growth velocity in a child with short stature and all school going children Conducting school health checkups maintaining proper school records of height and weight and counseling parents can help treating physicians to refer selected children and adolescents for further evaluation to specialist clinics. The shortcomings of this study include failure to calculate and plot growth velocity which requires a regular follow-up at six months to twelve months interval, which was not possible in this cross-sectional study. Secondly, it was a hospital based study where patients of chronic systemic diseases and critical illnesses are referred. Thirdly, the hospital is situated in an urban slum area so the majority of the patients belong to low socio-economic status with malnutrition being very common among them.

Keywords: Short stature, Constitutional growth delay (CGD), Familial short stature (FSS), Growth hormone deficiency (GHD)

Introduction

Short stature is defined as height that is two standard deviations below the mean height for age and sex (less than the 3rd percentile) or more than two standard deviations below the mid parental height.[1] A growth velocity disorder is defined as an abnormally slow growth rate, which may manifest as height deceleration across two major percentile lines on the growth chart. In some cases, short stature or slow growth is the initial sign of a serious underlying disease in an otherwise healthy-appearing child.[2]

Growth is a continuous biologic process subject to genetic, environmental, nutritional and hormonal influences. Altered growth potential may result from disturbance of any of these factors. Short stature, a frequent problem in the child population of developing countries. There is a diverse range of causes of short stature, but fortunately, the normal variant short stature do not need any medical or hormonal

treatment, however, associated emotional stress should be addressed appropriately.[3]

Chronic childhood diseases, if sufficiently severe, can lead to growth failure and short stature, important examples include; renal, pulmonary and cardiac diseases, malignancy, cystic fibrosis and celiac disease.[4-6]Celiac disease is a prominent example of treatable causes of growth failure especially in young children.[6]

In an effort to set an internationally usable standard for optimal growth in children, the World Health Organization (WHO) released growth charts based on the Multicentre Growth Reference Study for young children in 2006 and for children 5-19 in 2007. Rather than describing the growth of typical children, the Multicentre Growth Reference Study Describes the growth of children who are predominantly breastfed and raised under optimal conditions. Six study sites representing 5 continents were included: United States,

Brazil, Norway, Ghana, Oman, and India. Use of the WHO charts in developing nations results in identification of many more children as malnourished and eligible for therapeutic feeding programs[7].

Material & Method:

The present study was carried out in RKDF Medical College and Research Centre, Bhopal, M.P. The present study carried out from March 2017 - March 2018. This is a Prospective Cross Sectional study performed on All Children (Age 1-15 Years) Presenting to Out Patient Department. 151 cases were found to have short stature. These children were further evaluated for short stature.

The demographic profile, detailed history including; history of low birth weight (less than 2.5kg), psychosocial aspects and physical examination findings were recorded. Thorough history and physical examination were recorded on a predesigned proforma. Standing height without head or foot gear (measured with a stadiometer), weight and head circumference were measured. For height measurement, the head was positioned in Frankfurt plane, the head projection was placed at the crown of the head and the measurement was recorded to the nearest 0.1cm. Puberty was assessed in 11-15 year age group by rating the breast development in girls, genital developments in boys, pubic and axillary hair development in both sexes, according to Tanner's classification.[8]

Laboratory investigations included (complete blood count, ESR, urinalysis, hepatic and renal parameters, bone profile, Anti tissue transglutaminase (Anti-tTG IgA & IgG), serum free T4 and TSH levels). The patients who had raised levels of Anti-tTGs were confirmed with endoscopic duodenal biopsy. Radiographs of the left hand and wrist were done in all patients for rickets and bone age estimation using published standards of Greulich and Pyle's Atlas of Skeletal Development.

Inclusion criteria

1. Children between 1-15 years will be included.
2. Height below 3rd centile or less than 2sd below the median height for that age and sex according to the WHO standard.

Exclusion criteria

1. Children <1 year and >15 years.
2. Height above 3rd centile or more than 2sd.
3. Short stature secondary to trauma.
4. Patients with contractures and kyphoscoliosis

Results:

Table 1: type of short stature

Type	Total		Male		Female	
	No.	%	No.	%	No.	%
Proportionate	140	92.7	82	58.5	58	41.5
Disproportionate	11	7.3	6	54.5	5	45.5

Type of short stature Proportionate short stature is more common (92.7 %) than disproportionated short stature (7.3%) in our study.

Table 2: etiology

Type	Total		Male		Female		P value
	No.	%	No.	%	No.	%	
1. NORMAL VARIANT							0.254
FSS	25	16.5	18	72	7	28	
CGD	31	20.5	19	61.2	12	38.8	
2. ENDOCRINAL	24	15.8	9	37.5	15	62.5	
3. SYSTEMIC DISEASE	68	45.0	42	61.7	26	38.3	
4. GENETIC	03	2.2	0	0	03	100	

CGD, constitutional growth delay; FSS, familial short stature.

Shows etiology wise distribution of proportionate short stature, Systemic disease leads the table with 45 %, followed by normal variant 37 %, endocrinal cause 15.8 % and genetic 2%. Chi square test revealed p value of 0.254 (<0.05) which is not significant.

Table 3: disproportionated short stature

DISPROPORTIONATE	TOTAL		MALE		FEMALE	
	NO.	%	NO.	%	NO.	%
Skeletal deformity due to rickets	06	54.5	05	83.3	01	16.7
Achondroplasia	03	27.2	01	33.3	02	66.6
Tb spine	01	9	00	00	01	100
Perthes disease	01	9	01	100	00	0

Shows various etiology of disproportionate short stature. Skeletal deformity due to rickets is most common being 55% followed by achondroplasia 27 %, TB spine 1 child (9%) and perthes disease 1 Child (9 %).

Discussion:

FSS was diagnosed in 16.5.0% compared to 21.3% by Rabbani MW et al [10] and 15% by Sultan M et al.[11] CGD was diagnosed in 20.5 % compared to 17.3% by Sultan M et al. [11] Bhadada et al. 2003 [12] Normal variant short stature was the most common cause of short stature followed by endocrine causes. In males most common cause of short stature was constitutional growth delay, while in females most common cause of short stature was familial short stature.

Mehboob sultan et al. [11] CGD (22.1%) in males and FSS (27%) in females were the most common etiology Lashari et al. 2014 [13] Constitutional growth delay (CGD) and familial short stature (FSS) were identified as the most common, 55% of all short stature cases. Fahim et al. Most common causes found were variants of normal growth patterns, found in 28 (38.35%) children. CGD in 10 (13.7%), FSS in 8 (11.0%) and overlapping features of both CGD and FSS in 10 (13.7%).

Constitutional growth delay 140 (33%), familial short stature 60 (14%), and isolated growth hormone deficiency 100 (23.4%) were the most common causes But in study conducted by Lindsey et al.[14] reported normal variants in 80%, Shu et al. have documented in their studies that normal variants may comprise as much as 65% of the short stature which was different from what we reported[15].

Conclusion:

It is important to use appropriate growth charts and monitor growth velocity in a child with short stature and all school going children Conducting school health checkups maintaining proper school records of height and weight and counseling parents can help treating physicians to refer selected children and adolescents for further evaluation to specialist clinics. The shortcomings of this study include failure to calculate and plot growth velocity which requires a regular follow-up at six months to twelve months interval, which was not possible in this cross-sectional study. Secondly, it was a hospital based study where patients of chronic systemic diseases and critical illnesses are referred. Thirdly, the hospital is situated in an urban slum area so the majority of the patients belong to low socio-economic status with malnutrition being very common among them.

References:

1. Tanner JM, Goldstein H, Whitehouse RH. Standards for children's height at ages 2–9 years allowing for heights of parents. *Arch Dis Child.* 1970;45(244):755–762.
2. Moshang T Jr, Grimberg A. The effects of irradiation and chemotherapy on growth. *Endocrinol Metab Clin North Am.* 1996;25(3):731–741
3. Bhadada SK, Agarwal NK, Singh SK. Etiological profile of short stature. *Indian J Pediatr.* 2003;70(7):545–547.
4. Waheed KA, Irfan K, Ahmad TM, Khan HI. Spectrum of clinical presentation of chronic renal failure in children. *Pak Paediatr J.* 2002;26:167–171.
5. Bhadada SK, Bhansali A, Ravikumar P, Kochhar R, Nain CK, Dutta P, et al. Changing scenario in aetiological profile of short stature in India-growing importance of celiac disease: a study from tertiary care centre. *Indian J Pediatr.* 2011;78(1):41–44.
6. Von Rijn JC, Grote FK, Oostdijk W, Wit JM. Short stature and the probability of coeliac disease, in the absence of gastrointestinal symptoms. *Arch Dis Child.* 2004;89(9):882–883. Marshall WA, Tanner JM. Variations in the pattern of pubertal changes in boys. *Arch Dis Child.* 1970;45(239):13–23.
7. Boersma B, Houwen RH, Blum WF, et al. Catch-up growth and endocrine changes in childhood celiac disease. *Endocrine changes during catch-up growth.* *Horm Res.* 2002;58(suppl 1):57–65.
8. Tanner JM. Variations in the pattern of pubertal changes in girls. *Arch Dis Child.* 1969;44(235):291–303.
9. Barberia Leache E, Marañes Pallardo JP, Mourelle Martinez MR, et al. Tooth eruption in children with growth deficit. *J Int Assoc Dent Child.* 1988;19(2):29–35.
10. Waqar Rabbani M, Imran Khan W, Bilal Afzal A, Rabbani W. Causes of short stature identified in children presenting at a tertiary care hospital in Multan Pakistan. *Pak J Med Sci* 2013;29(1):53–7.
11. Sultan M, Afzal M, Qureshi SM, Aziz S, Lutfullah M, Khan SA, et al. Etiology of Short Stature in Children. *J Coll Physicians Surg Pak* 2008;18(8):493–97.
12. Bhadada S K, Agarwal N K, Singh S K, Agarwal J K. Aetiological profile of short stature. *Indian J Pediatr* 2003;70(7): 545-7.
13. Lashari SK, Korejo HB, Memon YM. To determine frequency of etiological factors in short statured patients presenting at an endocrine clinic of a tertiary care hospital. *Pak J Med Sci* 2014;30(4):858–61.
14. Lindsay R, Feldkamp M, Harris D, Robertson J, Rallison M. Utah growth study: growth standards and the prevalence of growth hormone deficiency. *J Pediatr.* 1994;125(1):29–35.
15. Shu SG, Chen YD, Chi CS. Clinical evaluation of short children referred by school screening: an analysis of 655 children. *Acta Paediatr Taiwan.* 2002;43(6):340–344.