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ETIOLOGY OF SHORT STATURE IN KASHMIR VALLEY OF NORTH INDIA

Endocrinology

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ABSTRACT

Short stature (SS) is a common pediatric problem and it might be the first sign of underlying illness. Studies documenting the burden and etiological profile of SS are scarce from India and are mostly limited to data obtained from tertiary care referral centers. Due to the lack of community-based and peripheral health institution related studies utilizing a standard protocol, the present study aimed to assess etiological profile of SS in two district hospitals of Kashmir valley. Method:In this prospective study, children aged 4–16 years attending hospitals underwent anthropometric measurements and height was plotted in IAP 2015 growth chart. The cause of SS was assessed using clinical and laboratory evaluations in assigned children with a height less than 2SD. Results: A total of 320 children belonging to two districts were evaluated, and it was identified that constitutional delay in growth and familial SS were the most common cause of SS in the study population (55.9%). Hypothyroidism, skeletal dysplasia and growth hormone deficiency were the most common pathological causes of SS seen in 11.6 , 7 and 4.6% children, respectively. Systemic diseases and type 1 DM were cause of short stature in 6 and 4.6 % children. As a significant percentage of children with SS had correctable causes, monitoring growth with a standard growth chart should be mandatory in all schools and anthropometry should be carried out in all children visiting hospitals.

KEYWORDS

INTRODUCTION:

With the gradual improvement in living conditions in the developing countries,more parents hav become concerned about the growth of their children.because of lack of awareness and nonavailability of investigative facilities in the past , growth disorders were not properly evaluated or recognized in this part of world. now with increased awareness about the possibilities of treatable disorders and the availability of diagnostic facilities, these disorders are more frequently investigated. short stature is a common pediatric endocrine problem. since normal growth is a barometer of health in childhood, any child who is growing normally, virtually excludes chronic physical or mental illnesses, hence, yearly evaluation of height and weight of all children is mandatory to assess their growth potential. multiple factors viz. genetic, prenatal, postnatal and local environmental factors, affect the growth, their relative significance would be variable in different populations. short stature (ss) is defined as height below 3rd percentile or less than two standard deviations (sds) below the median height for that age and sex according to the population standard; or even if the height is within the normal percentiles but growth velocity is consistently below 25th percentile over 6–12 months of observation.1,2. Approximately 3% of children in any population will be short, amongst which half will be physiological (familial or constitutional) and half will be pathologic. the age of onset of puberty varies in different population and it correlates more with the bone age (ba) than chronological age (ca).[1,2]

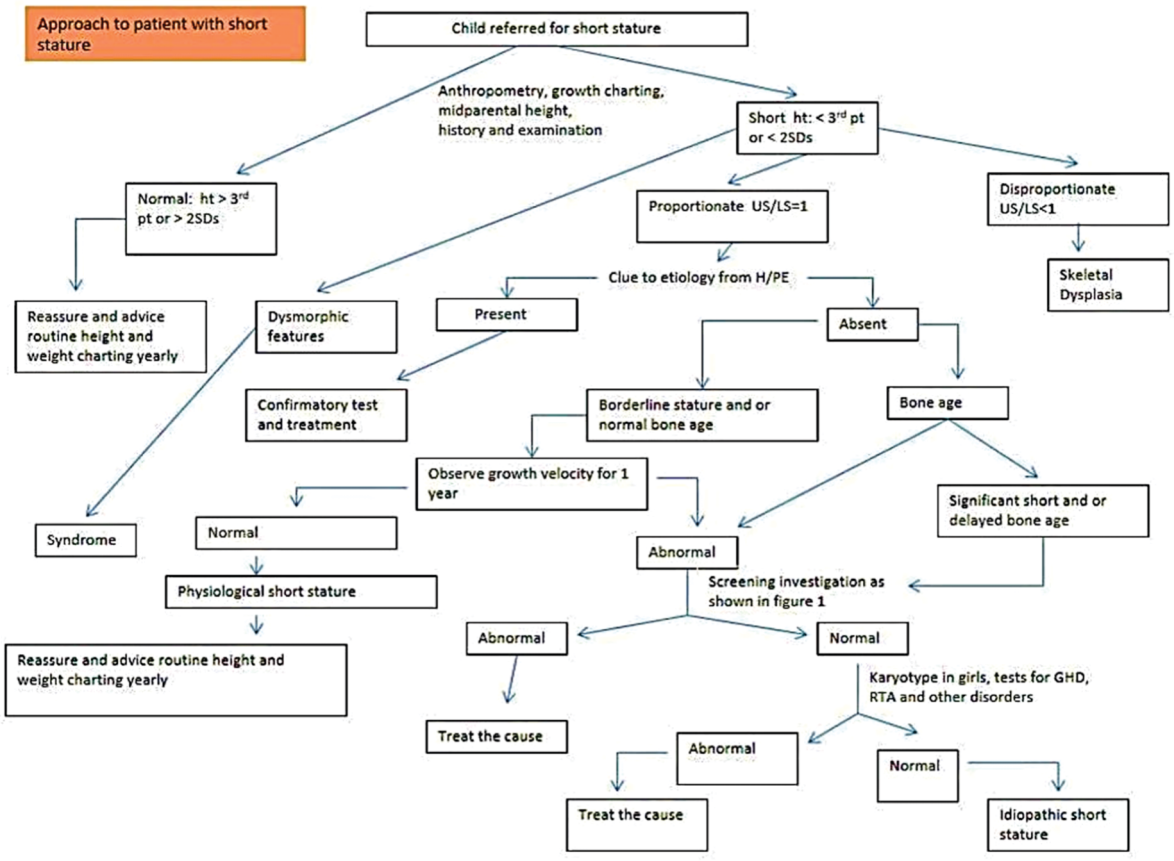
MATERIALS AND METHODS:

This prospective study was conducted from aug 2017 to may 2019 at two district hospitals(JLNM hospital srinagar and District Hospital baramulla) in kashmir valley.A total of 323 patients were enrolled who fulfilled the criteria of short stature.Out of these,300 patients fulfilled the inclusion criteria of whom 180 were male and 120 were females. The study subjects were selected on the basis of the following inclusion criteria: (1) age below 18 years; (2) height more than 2 SD below the mean (<3rd percentile), growth velocity (<4 cm/yr), or small for the midparental size; and (3) adequate follow-up (at least for six months). The exclusion criteria were: (1) height less than 2 SD below the mean (>3rd percentile) with normal growth rate.

All subjects were residents of Kashmir valley referred to the endocrine OPD clinics of two hospitals. All patients were examined by a single endocrinologist at both centres. An extensive history was taken and physical examination was performed.Anthropometric measurements were taken and the puberty staging was done according to Marshall and Tanner classification. Standard deviation score (SDS) was calculated in all subjects. Patients were followed every 3-6 months interval for anthropometry assessment. Data were collected on age, sex, parental heights, and the age of puberty for each parent. Primary screening tests including routine and complete blood count, ESR, renal function test, Ca, P, Alkaline phosphate , T4, TSH, urinalysis, and bone age radiographs were performed in all the subjects. Bone age was determined by Tanner and Whitehouse system [2].Chromosomal study was performed in females with significant short stature (height more than 3 SD below the mean) and with unknown etiology, with other stigmata of Turner Syndrome. Growth aberrations were grouped as: (1) physiological/normal variants of growth and (2) pathologic short stature. The pathologic group was subdivided into proportionate and disproportionate subgroups by assessing the upper to lower segment ratio. Physiological and pathological causes of short stature Physiological/normal variants of short stature included constitutional delay in growth and puberty (CDGP) (i.e., proportionate short stature with a normal growth rate, delayed skeletal maturation often with a family history of delayed pubertal development, or late adolescent growth spurt) and familial short stature (FSS) (i.e., proportionate short stature with a normal growth rate, skeletal age similar to chronologic age, absence of signifcant medical disorders, and short parents).Non-endocrine systemic disorders were diagnosed by history, examination and appropriately selected laboratory tests. Primary hypothyroidism was identifed by a low thyroxine level and an elevated thyrotropin level. The diagnosis of Turner syndrome was made on the basis of physical signs and confrmed by the chromosomal study.[3]

After excluding other causes of short stature, growth hormone deficiency (GHD) was considered if a child had severely short stature (height more than 3 SD below the mean), a subnormal growth rate (a 1-year height velocity more than 1 SD below the mean) or height more than 1.5 SD below the midparental height (average of mother's and father's height), delayed bone maturation, and was confirmed by the peak growth hormone concentration less than 10 ng/mL with two provocative tests done one week apart (clonidine and glucagon).[4]

A diagnosis of idiopathic short stature was considered in children with short stature, a subnormal growth rate, normal bone age, no apparent medical cause for growth failure, and normal growth hormone response to provocative testing. Skeletal dysplasia was confirmed by skeletal surveys.



Statistical Analysis

All categorical variables were expressed as frequencies and percentages and all continuous variables were expressed as mean ± standard deviation. All p values <0.05 were taken as significant. Statistical analysis was performed by using software SPSS version 17.

RESULTS:

A total of 323 children with short stature were evaluated, out of which 23 children did not meet the inclusion criteria, so the remaining 300 children participated in the study. One hundred eighty males (60%) and 120 females (40%) were identified as having short stature, with mean chronological age of 11.68±3.2 years, mean bone age of 7.88±2.8 years, the minimum and maximum height measured was 96 cm and 141 cm. The average height of children and their paternal and maternal heights were 119.34±12.66, 162.13±12.03, and 156.51±12.22 cm respectively. There was no signficant difference in chronological age, bone age and parent's heights; however, a statistically significant difference was noticed in the children's height and standard deviation score between the two sexes.

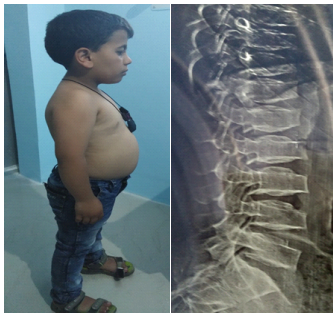
Diagnosis of 300 short children and adolescents, separated by gender.

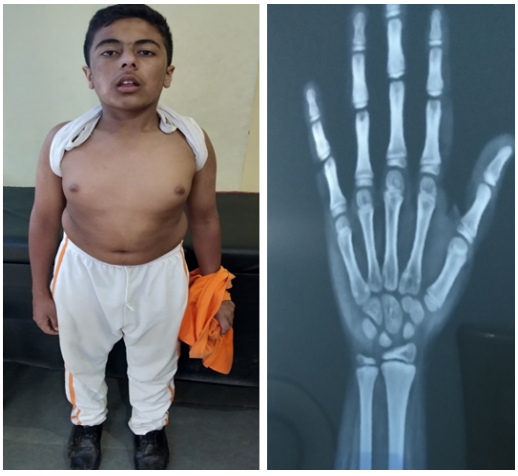
Diagnosis of 300 short children separated by gender			
	Boys(180)	Girls(120)	Total (300)
Normal variants			
CDGP	81(45%)	41(34%)	122(40.6%)
FSS	27(15%)	19(16%)	46(15.3%)
Pathological variants			
Proportionate			
GHD	10(5.5%)	4(3.3%)	14(4.6%)
Systemic disesase	10(5.5%)	8(6.6%)	18(6%)
Hypopituitarism	4(2.2%)	3(2.5%)	7(2.3%)
Type 1 DM	8(4.4%)	6(5%)	14(4.6)
Turners syndrome	-	3(2.5%)	3(1%)
Disproportionate			
Hypothyroid	20(11.1%)	15(12.5%)	35(11.6%)
Skeletal dysplasia	9(5%)	12(10%)	21(7%)
rickets	5(2.7%)	5(4.16%)	10(3.3%)
Syndromic short stature	6(3.3%)	4(3.3%)	10(3.3%)

With consideration to various category wise distribution of short stature, the physiological causes for short stature (constitutional delay in growth and puberty and familial short stature) were found in 55.9 % of short children and pathologic causes in 44.1 % of short children. In pathologic variety of SS, majority (57 %) belonged to proportionate category without discernable difference in gender distribution between proportionate and disproportionate varieties. Within the proportionate variety, systemic disorders (including chronic liver disease, chronic renal disease ,cardiac disorder, tuberculosis, nephrotic syndrome) and type 1 diabetes mellitus were the leading causes of short stature. However, within the disproportionate category, significantly higher numbers of girls and boys were found to have hypothyroidism.

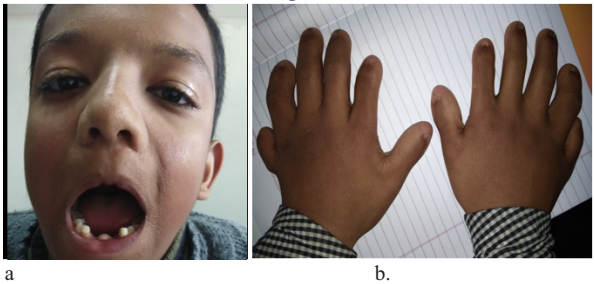
Furthermore, comparing the mean of SDS, bone age, chronological age, height age and growth velocity in 300 short children and adolescents, the youngest patients (3-5 years) referred to clinic for short stature had rickets and skeletal dysplasia. Late referrals (15-16.5 years) were due to systemic disorders and Turner syndrome; children with CDGP and FSS presented around the age of 13.28 years and 13.34 years respectively. On comparing the bone age of children with short stature, hypothyroidism causes the maximum bone age retardation followed by growth hormone deficiency while least bone age retardation was noticed in familial short stature.

Some specific and rare syndromic short stature cases:





A case of Skeletal dysplasia - spondyloepiphyseal dysplasia with short stature and normal bone age



a b.

c. d. e.

Syndromic short stature: a ,b Ellis van crevald syndrome(enamel hypoplasia and ectodermal dysplasia)

c,d,e Rabson mendalhal syndrome (insulin resistance syndrome with ectodermal hypoplasia, enamel hypoplasia)

DISCUSSION:

In this study, we presented characteristics and distributions of various diagnoses of short stature in children who visited endocrinology clinic due to short stature over the period of 2 years. To facilitate the detection of growth disorders, growth monitoring implying regular measurements of weight and height is essential; failure to do so leads to undetected and untreated short stature in children. Short stature may be considered as the tip of the iceberg of many treatable disorders .Therefore, the early diagnosis of short stature is of paramount importance and treatment for the short stature would be effective only before epiphyseal fusion.[5,6]

The mean age of children evaluated for short stature was 11.65±3.2 years for males and 11.78±3.1 years for females, which corresponds to data reported by Song KC et al. in their studies. There was no significant difference in chronological, bone age and parental height, however, statistically significant differences were noticed in the children's height and standard deviation scores between two sexes which also correspond to the above-mentioned study.[7]

The contribution of hypothyroidism was also observed to be relatively higher in the current study when compared to the hospital-based studies. It can be reasonably assumed that many cases of hypothyroidism are also not reaching the endocrinology units, which can be attributed to either underdiagnosis or treatment of certain proportion of the cases at the level of primary care practitioners. Colaco et al [8] in their study observed endocrine abnormalities as the most common cause of short stature, while Zargar et al[9] in their retrospective study found GH deficiency to be the most common cause of short stature which accounted for 22.8% of their cases. In our population, the most common cause of was CDGD and normal variant short stature. This difference in the etiology of short stature from different centers could be related to genetic, nutritional, socio-economic and other related factors. In a country like India where there are gross regional differences it is essential to precisely know the cause of short stature for proper medical care.

REFERENCES

1. Kamboj M. Short stature and growth hormone. Indian J Pediatr. 2005;72(2):149-57
2. Lifshitz F, Cervantes CD. Short stature. In: Lifshitz F, editor. Pediatric Endocrinology. 3rd ed. NewYork, NY: Marcel Dekker, Inc.; 1996. pp. 1–18, revised and expanded.
3. Bondy CA, and for The Turner Syndrome Consensus Study Group. Care of girls and women with Turner syndrome: A guideline of the Turner Syndrome Study Group. J Clin Endocrinol Metab. 2007 92(1):10-25.
4. Stanley T. Diagnosis of growth hormone d ciency in childhood. Curr Opin Endocrinol Diabetes Obes. 2012;19:47–52.15refed
5. Frindik JP, Kemp SF, Hunold JJ. Near adult heights after growth hormone treatment in patients with idiopathic short stature or idiopathic growth hormone d ciency. J Pediatr Endocrinol Metab 2003;16(Suppl 3):607-12. PMID: 12795361
6. Chowdhury SP, Sarkar TK, Haldar D, Taraphdar P, Naskar TK, Sarkar GN. Short stature in children: Experience from a tertiary care hospital in Kolkata, India. The Health. 2011;2(4):139-42
7. Song KC, Jin SL, Kwon AR, Chae HW, Ahn JM, Kim DH, et al. Etiologies and characteristics of children with chief complaint of short stature. Ann Pediatr Endocrinol Metab 2015;20(1):34-9
8. Colaco P, Desai M. Identification of a child with short stature. Indian Pediatr 1990; 27 : 1159-1164.
9. Zargar AH. An aetiological profile of short stature in the Indian subcontinent. JPediatr Child Health 1998; 34 (16); 571-576