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Original Research Article

A clinical and radiological profile of short stature in central India

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ABSTRACT

Background: Stature is methodically described as height vertex. Short stature can be defined as an individual in whom height is two standard deviations below the standard mean height of a given sex, age and population.
Methods: A cross sectional study was conducted in 200 children attending endocrine OPD over 12 months from October 2019 to September 2020 with complaints of short stature to study the clinical and radiological profile of children between 2-15 years of age.
Results: Totally 200 children with short stature were studied in age group less than 15 years. Total no. of males were 105 (52.5%) and females were 95 (47.5%). The highest percentage of patients i.e., 38.5% belonged to 5-10 years followed by 36% who were of 10-15 years of age group while, the least i.e., only 25.5% belonged to <5 years of age group.
Conclusions: In our study endocrine causes are most common including hypothyroid (27.5%), GHD (2.5%) and adrenal insufficiency (1%). 2nd most common are normal variants CDGP (11.5%) and FSS (9%). After endocrine causes this dominance of normal variants of growth is in accordance with other worldwide studies. Thus, it is very important to remember that many cases of short stature in general population may be normal, as determined by meticulous measurements, and determination of bone age using standard charts and expert's radiological opinion.

Keywords: Short Stature, Clinical profile, Radiological profile

INTRODUCTION

Stature is methodically described as height vertex. Short stature can be defined as an individual in whom height is two standard deviations below the standard mean height of a given sex, age and population.[1,2] Normal growth is considered as a gauge of good health and short stature possibly be the first sign of various pathological conditions.[3] Growth can be impaired by multiple factors, including prenatal, postnatal, genetic, and native environmental elements.[4] The short stature is like a tip of iceberg of several underlying diseases. Nearly 3% children in any population are found to be short, amid which 50% will be physiological (familial or constitutional) and 50% will be pathological.[5] Familial short stature and constitutional growth delay (CGD) most common causes after first 2 years of life.[6] The assessment of the combination of 3 parameters: low height Standard Deviations, discrepancy from Target Height, and growth deceleration is essential for early diagnosis of growth disorers.[7] In this we have done a cross sectional study on clinical and radiological profile of short stature in a tertiary care centre in central India. Our objective was to determine the clinical profile of short stature in children in 2-15years of age the frequency of different physiological variants from pathological conditions, to access the frequency of proportionate and disproportionate causes of short stature and to evaluate skeletal maturity in relation to chronological age and height by bone age assessment. In radiological criteria we have done bone age in all children and compared it with chronological age of the children.

METHODS

A cross sectional study was conducted in 200 children attending endocrine OPD at SAIMS medical college, Indore, over 12 months from October 2019 to September 2020 with complaints of short stature to study the clinical and radiological profile of children between 2-15 years of age. Inclusion criteria was children with 2-15 years of age with height < 3rd centile or -2SD below the median height Or -2SD below MPH for that age and sex according to the population standard. Children with age less than 2 years and more than 15 years 2 and with spinal deformity are excluded.

All cases with short stature attending OPD and/or IPD height were plotted on WHO growth charts (2-5 years) and IAP growth charts (5-15 years). They were grouped as normal or pathological variants on basis of clinical condition. On basis of US; LS ratio (Indian standard) study group were divided in proportionate and disproportionate. They were further investigated to find out aetiologies. Radiological evaluation was done for all cases by calculating bone age using Tanner White house staging 3 and then compared with chronological age to calculate bone age retardation. Relevant investigations will be according to the probable aetiology. Ethical committee clearance was taken for the above mentioned method. Then data was collected based on the proforma. The parameters are evaluated using Chi square test and SPSS16 Version. A probability value less than 0.05 will be considered as significant.

RESULTS

Totally 200 children with short stature were studied in age group less than 15 years. Total number of males were 105 (52.5%) and females were 95 (47.5%). The highest percentage of patients i.e., 38.5% belonged to 5-10 Years followed by 36% who were of 10-15 years of age group while, the least i.e., only 25.5% belonged to <5 years of age group. Among genders 47% were females and 53 % were males with female:male of 0.9. The highest percentage of patients i.e., 88.5% had Normal US LS RATIO followed by 11% who Increased Ratio while, the least i.e., only 0.5% had decreased US LS ratio.

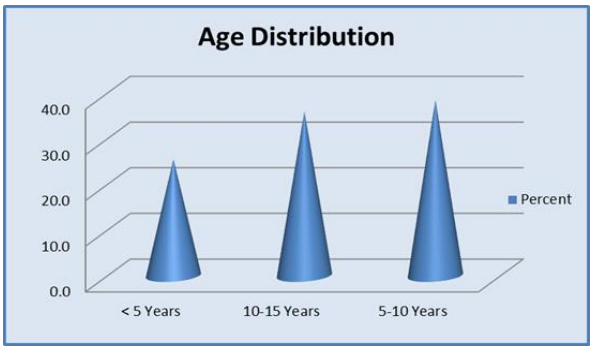

Figure 1: Short stature distribution in different age groups.

The higher percentage of patients i.e., 83% had proportionate SS status while, only 17% were having disproportionate status. An equal percentage of patients i.e., 32% had chronic illness and endocrine followed by 15.5% who had Nutritional, 11.5% had CDGP while, the least i.e., only 9% were having FSS. The higher percentage of patients i.e., 51.5% had CA-BA>2. The above table shows the association between final diagnosis and age group of respondents which found to be statistically significant ($p<0.05$). It implies that final diagnosis of respondents differs significantly with their Age Group. Respondents having chronic illness show an equal percentage 39.1% for 10-15 and 5-10 years of age groups while, the lowest percentage for <5 years. Respondents having endocrine disorder show the highest percentage 50% for 5-10 years. On the other hand, respondents having Nutritional cause show the highest percentage 67.7% for <5 years.

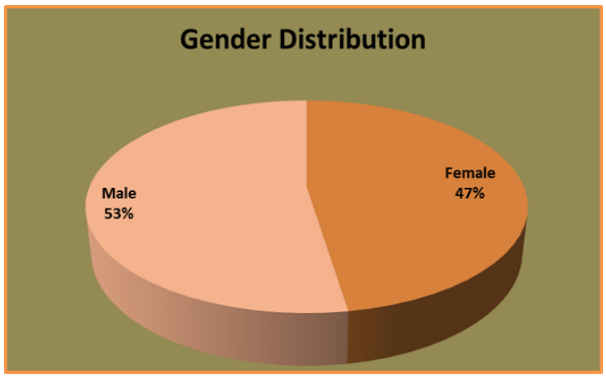

Figure 2: Short stature distribution among genders.

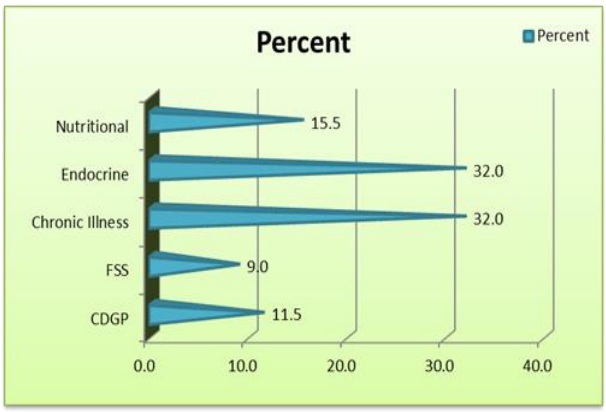

Figure 3: Etiological classification of data of the study.

Table 1: Distribution based on US LS ratio.

US LS ratio	N	%
Decreased	1	0.5
Increased	22	11.0
Normal	177	88.5
Total	200	100.0

Table 2: Distribution based on proportionate SS status.

Proportionate SS Status	N	%
Proportionate	166	83.0
Disproportionate	34	17.0
Total	200	100.0

Table 3: Distribution based on CA-BA>2.

CA-BA>2	N	%
No	97	48.5
Yes	103	51.5
Total	200	100.0

DISCUSSION

The objective of the study was to determine the etiologies and describe the characteristics of short stature patients who attended the pediatric endocrinology clinic. 200 children between 2 to 15 years of age at SAIMS met the inclusion and exclusion criteria were recruited. We had cases of, hypothyroidism 55 cases (27.5%), CDGP 23 (11.5%) Thalassemia 21 (10.5%), FSS 18 (9%), SGA seaquel 14 (7%) and SAM 12 (6%). In our study A total of 200 patients of growth retardation have been Studied of these 105 (52.5%) were males and 95 (47.5%) were females. Majority of the patients were seen between the ages group of 5-10 years (38.5%), SS lowest incidence seen in <5 years (25.5%) with mean chronological age 7.5 years. Male:female ratio was 1:1. Hypothyroidism was the most common aetiology (27.5%) followed by normal variants including CDGP and FSS (21%) and pathological short stature was found in 79%of the cases, of which 24.5% had hypothyroid. The proportionate short stature is present in 83% cases. In a retrospective study was conducted in the department of paediatrics, Chettinad hospital and research institute commonest age group affected was <5 years about 48%, 34% were 5-10 years and 17% were >10 years. 48% were males and 52% were females.[8]

Table 4: Association between final diagnosis and age group.

Age group		Final Diagnosis					Total
		CDGP	FSS	Chronic Illness	Endocrine	Nutritional	
<5	N	0	1	14	15	21	51
	%	0.0	5.6	21.9	23.4	67.7	25.5
10-15	N	16	7	25	17	7	72
	%	69.6	38.9	39.1	26.6	22.6	36.0
5-10	N	7	10	25	32	3	77
	%	30.4	55.6	39.1	50.0	9.7	38.5
Total	N	23	18	64	64	31	200
	%	100.0	100.0	100.0	100.0	100.0	100.0
Pearson Chi-Square			Value	Df	P value	Result	
			51.984	8	0.000	Significant	

Another prospective study was conducted by Bhadada et al a total of 352 patients of growth retardation have been studied. Of these 194 (55.11%) were males and 158 (44.89%) were females. Majority of the patients were seen between the age group of 13 to 18 years. Females outnumbered males in the age group of >18 years. In this study the short stature status of patients does not differ significantly with their Gender with males 52.5% and females 47.5%. Both proportionate and disproptionate SS are more common in males as compared to females. Patients having CDGP show higher percentage 73.9% for Male while, 26.1% for female. Cases having FSS show higher percentage 55.6% for Female while, 44.4% for male.[9] In a study by Gutch et al found in there, the male to female ratio to be 1.6:1, with mean chronological age of 11.6 years.[5]

Limitations

Prime limitation was follow up of the patients after investigation for data analysis and we have not included patients less than 2 years of age so many congenital hypothyroidism patients present in infancy that might not be included in our data as it is a leading causes of short stature in children Despite the approving progression in most cases, in many specific conditions children of short stature can benefit from the advances in diagnosis and therapy. In this light, it is vital for the paediatrician to keep up-to-date and acquainted with the possible benefits of early diagnosis and treatment. Due to the complexity of the analysis and the plentiful possibilities, it is unrealistic to explore all the prospects for all children.[10]

CONCLUSION

Therefore, through this study we want to show light upon different factors leading to short stature among children. In our study endocrine causes are most common including hypothyroid (27.5%), GHD (2.5%) and adrenal insufficiency (1%). 2nd most common are normal variants CDGP (11.5%) and FSS (9%). After endocrine causes this dominance of normal variants of growth is in accordance with other worldwide studies. Thus, it is very important to

remember that many cases of short stature in general population may be normal, as determined by meticulous measurements, and determination of bone age using standard charts and expert's radiological opinion.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Warrier V, Krishan K, Shedge R, Kanchan T. Height Assessment. Treasure Island (FL): Stat Pearls Publishing; 2020.
2. Rani D, Shrestha R, Kanchan T, et al. Short Stature. Treasure Island (FL): Stat Pearls Publishing; 2020.
3. Velayutham K, Selvan SS, Jeyabalaji RV, Balaji S. Prevalence and etiological profile of short stature among school children in a South Indian population. Indian J Endocrinol Metab. 2017;21(6):820.
4. Polidori N, Castorani V, Mohn A, Chiarelli F. Deciphering short stature in children. Ann Pediatr Endocrinol Metab. 2020;25(2):69.
5. Gutch M, Kumar S, Razi SM, Gupta KK, Gupta A. Assessment of insulin sensitivity/resistance. Indian J Endocrinol Metab. 2015;19(1):160-4.
6. Lam WF, Hau WL, Lam TS. Evaluation of referrals for genetic investigation of short stature in Hong Kong. Chin Med J. 2002;115(4):607-11.
7. Saari A, Sankilampi U, Hannila ML, Saha MT, Mäkitie O, Dunkel L. Screening of turner syndrome with novel auxological criteria facilitates early diagnosis. J Clin Endocrinol Metab. 2012;97(11):E2125-32.
8. Ramagopal G, Vasudevan J. Clinical and etiological profile of children with pathological short stature. Int J Contemp Pediatr. 2017;4(1):73.
9. Bhadada SK, Agrawal NK, Singh SK, Agrawal JK. Etiological profile of short stature. The Indian J Pediatr. 2003;70(7):545-7.
10. Strufaldi MW, Silva EM, Puccini RF. Follow-up of children and adolescents with short stature: the importance of the growth rate. Sao Paulo Med J. 2005; 123(3):128.

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