Original Article

Short stature in children: Pattern and frequency in a pediatric clinic, Riyadh, Saudi Arabia

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ABSTRACT

Longitudinal growth assessment is essential in child care. Short stature can be promptly recognized only with accurate measurements of growth and critical analysis of growth data. The objective of this study was to determine the pattern of short stature among patients referred to an endocrine pediatric clinic, King Khalid University Hospital (KKUH), Riyadh, Saudi Arabia and to ascertain the aetiological profile of short stature.

This is a retrospective review of patients referred to a pediatric endocrine clinic with short stature during the period January 1990 and December 2009. After a proper detailed medical history, growth analysis and physical examination, followed by a radiological (bone age) and laboratory screening (complete blood count and thyroid function). Growth hormone stimulation tests were performed when indicated. Magnetic resonance imaging (MRI) of the pituitary was performed when necessary. As well, celiac screening and small bowel biopsy were performed when appropriate.

During the period under review, hundred and ten patients were evaluated for short stature. Their age ranged from 2 years and six months to 4 years. The male to female ratio was 1.3:1. The commonest etiology was genetic short stature found in 57 (51.8%) patients, while in the other 53 (48.2%) patients, variable endocrine and nutritional causes were noted. Short stature was a common referral. A wide variety of etiological diagnosis was noticed with genetic short stature being the commonest. A wide variety of endocrine causes were evident, with growth hormone deficiency, as a results of different etiologies, being the commonest.

Key words: Short stature, children, constitutional growth delay, growth hormone deficiency.

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INTRODUCTION

Growth is an important objective parameter of general health of a child. Short stature is a common problem encountered by practicing pediatricians. It results from an intricate process which involves integration of genetic potential, functioning endocrine system, nutritional status, effects of chronic diseases, and physical activity level. A disturbance at any point of these levels may affect growth adversely resulting in short stature [1] which is defined as a height of less than 3rd percentile or 2 standard deviations below the mean height for age and sex in the same ethnic group.

Therefore, short stature ranges from normal variants like familial short stature and constitutional growth delay to pathological conditions like endocrine and systemic diseases. The normal variants form is the commonest, and can be suggested by basic history and physical examination coupled with a simple skeletal radiograph for bone age [2-4].

This retrospective study was contemplated with the objective to determine the pattern of short stature among children referred to an endocrine pediatric clinic, King Khalid University Hospital (KKUH), King Saud University (KSU), Riyadh, Saudi Arabia and ascertain the etiological rofile.

METHODS

During the period between January 1990 and December 2009, children with short stature referred to a pediatric endocrine clinic, King Khalid University Hospital KKUH), King Saud University (KSU), Riyadh, Saudi Arabia, were reviewed. After a proper detailed medical history, including nutritional history, parents and siblings height and age at puberty, birth weight, assessing the growth velocity and complete physical examination, followed by radiological assessment including bone age [5], and appropriate laboratory screening (complete blood count, erythrocyte sedimentation rate, liver, renal and bone profiles and thyroid function). A harbender stadiometer was used for height measurement. Chromosomal analysis was performed in the peripheral blood in females with otherwise unexplained short stature to rule out Turner's syndrome. In those patients with sub-normal growth velocity (<4 cm/year) dynamic growth hormones testing was performed following a standard procedure (one physiological and two biochemical testing). Although, a random serum growth hormone value of more than 10mg/dl generally exclude growth hormone deficiency (GHD), a random low serum growth hormone concentration does not confirm the diagnosis of GHD [6-10]. In patients with proved growth hormone deficiency by dynamic testing, magnetic resonance of the pituitary (MRI) was performed. Additionally, celiac screening was undertaken in all short children with unexplained short stature, and confirmed by small biopsy if indicated [11].

RESULTS

During the period under review, January 1990 to December 2009, hundred and ten patients with short stature were evaluated in a pediatric endocrine clinic, King Khalid University Hospital (KKUH), King Saud University (KSU), Riyadh, Saudi Arabia. Their age ranged between 2 years and 6 months to 14 years. The male to female ratio was 1.3:1. A wide spectrum of etiological causes of short stature were seen. Table 1 showed that the commonest form of short stature is genetic accounting for 51.8%. Although the referral is to an endocrine clinic, yet the endocrine causes accounts for only 29.1% only. Various causes were noted (Table 2). Furthermore, intrauterine growth retardation is a well known cause. Also, Turner syndrome and celiac diseases are two very important causes which should be investigated and carefully looked for.

Table 1- Etiology of short stature in 110 short children.

Cause	No. of patients	Percentage
Genetic short stature	57	51.8%
Non-genetic short stature	53	48.2%
Total	110	100%

Table 2- The endocrine etiology among 110 children with short stature.

Etiology	No. of patients	Percentage
Idiopathic growth hormone deficiency	7	21.8%
Primary hypothyroidism	6	18.7%
Congenital adrenal hyperplasia	4	12.5%
Laron dwarfism	2	6.2%
Emoty sella syndrome	2	6.2%
Craniopharyngioma	2	6.2%
Septo-optic-hypoplasia	2	6.2%
Partial panhypopituitarism	2	6.2%
Uncontrolled type 1 Diabetes Mellitus	2	6.2%
Subarachnoid cyst	1	3.1%
Histocytosis -X	1	1.9%
Pseudohypoparathyroidism	1	1.9%
Total	32	100%

Table 3- Non-endocrine etiology among 110 children with short stature.

Aetiology	No. of patients	Percentage
Small for gestational age	5	23.8%
Dysmorphic child	4	19%
Turner's syndrome	3	14.2%
Coeliac disease	3	14.2%
Rickets	4	19%
Skeletal dysplasia	2	9.5%
Total	21	100%

DISCUSSION

Longitudinal growth assessment is essential in child care. Short stature can be promptly recognized only with accurate measurements of growth and critical analysis of growth chart. Short stature is defined as a standing height more than 2 standard deviation below the mean for sex and age (or below 3rd percentile).

The causes of short stature can be divided into three broad categories: genetic short stature (familial short stature, and constitutional delay of growth and development). Chronic diseases including under nutrition with its different causes, and endocrine diseases such as hypothyroidism, growth hormone secretion abnormalities, and excessive secretion of androgens as in congenital adrenal hyperplasia. Most short children evaluated by clinicians in developed countries have genetic short stature as shown in our series (51.8%). The hallmarks of genetic (familial)

short stature include a bone age appropriate for chronologic age, normal growth velocity, and predicted adult height appropriate to the familial pattern. By contrast, constitutional growth delay is characterized by delayed bone age, normal growth velocity, and predicted adult height appropriate to the familial pattern. Patient with constitutional growth delay typically have a first degree or second degree relative with constitutional growth delay and late puberty. This is in agreement with our study [12, 13].

Endocrine disorders such as hypothyroidism, congenital adrenal hyperplasia, growth hormone deficiency, uncontrolled type 1 diabetes mellitus, can cause growth failure. Therefore identifying the cause is essential for optimal management. Short stature is also associated with genetic diseases, such as Turner syndrome, rickets and skeletal dysplasia; hence, chromosomal analysis should be performed in any short female [14-17].

Intrauterine growth retardation (IUGR) is considered as an import cause of short stature, especially if affected children did not catch up by two years [18]. This is suggested from our observation, and confirmed the need for knowing birth weight in the assessment of short stature.

Finally, celiac disease must be considered as an important cause of short stature worldwide involving all the ethnic groups as evident from its epidemiology and the availability of new, simple, very sensitive and specific serological tests (anti-gliadin, anti-endomysium and anti-transglutaminase antibody assays) [19, 20]. Assiri showed a very high prevalence of the disease in the Saudi Arabian community, with short stature being the only presenting symptoms [21].

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