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CAUSES OF SHORT STATURE IN PRIMARY SCHOOL CHILDREN IN NEW DAMIETTA CITY.

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ABSTRACT:

Background and objectives:-. Short stature, optimally defined relative to the genetic development of the individual, is recognized by comparing an individual child's height with that of a large population of a similar genetic background and, more particularly, using the mid-parental target height, Identifying causes of short stature in primary school children help us to direct community efforts to treat common causes in this age group.

Methods: In This cross sectional study includes all children (males and females) of primary schools in new Damietta city which include 10 primary schools.(n=10064 child)whose height measured by tape and potted in Egyptian growth charts and identifying short stature whose height below -2 SD in charts ,short stature undergo clinical examination and investigation then reassessed after 6 and 12 months respectively from may 2016 to October 2017 .

Results: We found in this study there is 1 short child for every 420 studied child by percentage 0.24%, regarding to the causes of short stature , we found in our study that familial short stature is the leading cause of short stature in primary school children in new Damietta city ,the second cause is growth hormone deficiency.

Conclusion: familial short stature the commonest cause of short stature in primary school children in new Damietta city followed by growth hormone deficiency.

INTRODUCTION

Short stature can be promptly recognized only with accurate measurements of growth and critical analysis of growth data.

Short stature, optimally defined relative to the genetic development of the individual, is recognized by comparing an individual child's height with that of a large population of a similar genetic background and, more particularly, using the mid-parental target height. Adult height is largely genetically predetermined; typically, 80% or more of the variation in height can be explained by genetic factors, although environmental factors also play a pivotal role[1],Compared with a well-nourished, genetically relevant population, short stature is defined as a standing height more than 2 standard deviations (SDs) below the mean (or below the 2.5 percentile) for sex[2].

Height velocity is The vertical growth of a child during a specified unit of time, e.g., per month or per year.Normal growth velocity at prepupertal stage is 5 to 5.5 per year[3].

Skeletal maturation is typically determined by the bone age, which is assessed using anteroposterior radiography of the left hand and wrist. Sex-specific reference data for standing height, head circumference, and weight have been published for most developed countries, most ethnic subpopulations (including Asians and blacks), and the most common genetic disorders (eg, Down syndrome, Ullrich-Turner syndrome, achondroplasia).[4]

The causes of short stature can be divided into 3 broad categories: chronic disease (including undernutrition genetic disorders), familial short stature, and constitutional delay of growth and development. Endocrine diseases are rare causes of short stature . The hallmark of endocrine disease is linear GF that occurs to a greater degree than weight loss. Most short children evaluated by clinicians in developed countries have familial short stature, constitutional growth delay, or both .Endocranial short stature and constitutional growth delay are diagnoses of exclusion[5]

PATIENTS AND METHOD

This study was carried out during the period from April (2016) to September This cross sectional study includes all children (males and females) of primary schools in new Damietta city which include 10 primary schools.(n=10064 child) In this study we measured the height of children by the tape after removal of the child shoes, Making sure that legs are straight, arms are at sides, and shoulders at level, Making sure the child is looking straight forward, Taking the measurement while the child stands with head, shoulders, buttocks, and heels touching a flat surface[2].

Then we pots the results at Egyptian growth charts to detect children who have short stature[6].

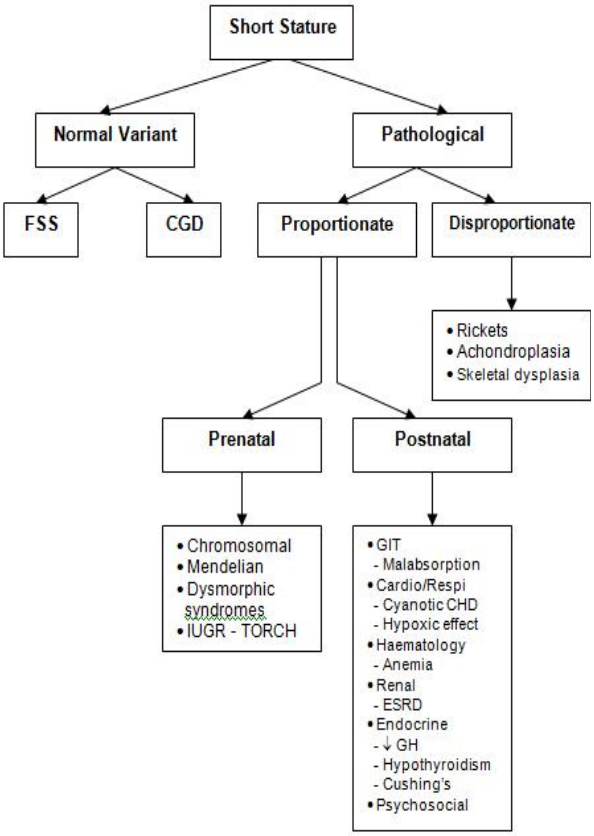
All short children whose height below - 2 standard deviation for age on WHO growth charts (24 child) will undergo the following:
Taking history (perinatal history, nutritional history, family history, history of chronic diseases, social history, vaccination history, developmental history) Then examination of all systems (general examination, chest, heart, abdomen, skeletal system, neurological examination, etc….) Calculating midparental height.

Then All short children undergo the following investigations:

1- complete blood picture by automated analyzer anemia defined as hemoglobin below 11 mg/dl[7].
2- kidney function test(urea blood level and creatinine level)
3- urine analysis by microscopic examination
4- stool analysis by microscopic examination(sedimentation method)
5- X ray for bone age according to age(x ray on bone of left hand)[8].

Then other investigations according to the following algorithm:

Diagnostic algorithm for short stature[9].



FSS=familial short stature
CHD=chronic heart disease
CGD=constitutional growth delay
GH=growth hormone
IUGR=intrauterine growth retardation
ESRD=end stage renal disease
GIT=gastrointestinal tract

All short children were reassessed after 6months and 1 year.

RESULTS:

Table 1: demographic data of all studied children

(n=10064 child)

		Number (%)
age	***Mean (SD) 8.72 (1.75)***	***minimum- maximum 6-11***
sex	Male	*4988 (49.5%)*
	Female	*5076 (50.5%)*
Residence	Urban	*8943 (89%)*
	Rural	*1121(11%)*

Table 2: frequency of short stature among studied cases.

		Number (%)
Short stature	yes	24 (0.24%)
	No	10040 (99.76%)

Table 3: clinical data among normal and short stature

	Short stature (N=24)	Normal (N=10040)
	Number (%)	Number (%)
pale(anemia)	11 (45.83%)	865 (8.62%)
constipation	2 (8.33%)	50 (0.50%)
chronic lung disease	0 (0.00%)	70 (0.70%)
DM	0 (0.00%0)	36 (0.36%)

Table 4: standard deviation of height among all studied children

	All (n=10064)
	Number (%)
above -2 SD	10040 (97.7%)
From -2 SD to -3 SD	23 (2.2%)
below -3SD	1 (0.1%)

table 5: SD of short cases after 6 months and after 1 year.

	from-2 SD to -3 SD	below-3 SD
after 6 months	23	1
after 1 year	23	1

table6 : growth velocity of short cases per 6 months.

		Familial short stature	Growth hormone deficiency
After 6 months	**Less than 2cm**	no cases	1 case
	More than 2cm	22 case	No case s
After 1 year	**Less than 4cm**	No cases	1 case
	More than 4cm	22 case	No cases

Table7: risk factors of short stature among studied cases.

	Short stature (n=24)	Normal (n=1040)
	Number (%)	Number (%)
short stature of one or both parents	23 (95.83%)	2 (0.02%)
under nutrition	13 (54.17%)	887 (8.83%)
low socioeconomic class	4 (16.67%)	1000 (9.96%)

Table 8: anthropometric measures of all short cases.

	Mean	Median	Minimum	Maximum
age	8.96	9.50	6.00	11.00
Height SDS	-2.42	-2.20	-6.20	-2.10
MPH SDS	.17	.10	.00	.50
Growth velocity per 6 months	2.97	3.00	.50	4.00

Table 9: investigations data of all short cases.

(n=24)

		Number (%)
CBC	**Anemia**	10 (41.7%)
	Normal	14 (58.3%)
urine	**pus cells**	1 (4.2%)
	Normal	23 (95.8%)
stool	**indigestive food**	3 (12.5%)
	Oxyrius	1 (4.2%)
	Normal	20 (83.3%)
Growth hormone level	**Normal**	23(95.8%)
	Lower than normal	1(4.2%)
Bone age	**delayed 2 years or more**	1 (4.2%)
	delayed less than 2 years	0 (0%)
	Normal	23 (95.8%)

Table 10:Aetiology of short stature cases.

		Number (%)
short stature	**Growth hormone deficiency**	1 (4.2%)
	Familial	23 (95.8%)

Table 11: anthropometric measures for familial and GH deficiency causes.

	Short stature									
	Growth hormone deficiency					familial				
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum
age	10.00	.	10.00	10.00	10.00	8.91	1.68	9.00	6.00	11.00
height sds	-2.10-	.	-2.10-	-2.10-	-2.10-	-2.43-	.84	-2.20-	-6.20-	-2.10-
MPH SDS	.10	.	.10	.10	.10	.17	.18	.10	.00	.50
gv per 6 months	3.00	.	3.00	3.00	3.00	2.97	.65	3.00	.50	4.00
Weight	40.00	.	40.00	40.00	40.00	26.65	6.20	25.00	19.00	39.00

table 12: comparison between familial and growth hormone deficiency short stature regards to laboratory data.

		Short stature	
		Growth hormone deficiency	familial
		Number (%)	Number (%)
CBC	anemia	0 (.0%)	10 (43.5%)
	normal	1 (100.0%)	13 (56.5%)
urine	pus cells	0 (.0%)	1 (4.3%)
	normal	1 (100.0%)	22 (95.7%)
stool	indigestive food	1 (100.0%)	2 (8.7%)
	oxyrius	0 (.0%)	1 (4.3%)
	normal	0 (.0%)	20 (87.0%)
Growth hormone	normal	0 (.0%)	23 (100%)
	below normal	1(100%)	0 (.0%)

DISCUSSION

Short stature can be a sign of disease, disability, and social problems causing psychological stress especially at school age period[10]

Short stature also may be missed by parents, so height measureis routine examination in general practitioner and pediatrician doctor clinics[2].

Early diagnosis and treatment give a good impact on final height of short children especially endocrinal causes as growth hormone deficiency as treatment of this cases in Egypt available easily at health insurance hospitals and all school children in Egypt are included in this program of health insurance [11].

Also, short stature due to chronic disease is revisable if have appropriated treatment[10].

our study is held in all primary school children in new Damietta city (n=10064 child) from May 2016 to October 2017 which include 4988 males(49.5%) and5076 female(50.5%).

In our study we used the Egyptian growth chart[6].
We defined short stature as -2 SD below the mean for sex[2].

We found in this study there is 1 short child for every 420 studied child by percentage 0.24%.

This result is disagre with the result of study done in Jordan in 2016 in school children which held on 2702 child aged from 6 to 17 years by percentage of short stature 4.7%[12] but some different come in result as in Jordan study[12] there is some different of age group and done in whole country with random selection of schools .

This result also disagre with study held in 2009 in palestanine school children in west bank which held on1942 students in 65 schools in Ramallah and Hebron governorates aged from 13 to 15 years[13] with results 9.2% SS.

the cause of differences may be due to difference in socioeconomic state and different age group in both studies.

Regarding to the gender ,in present study we found the incidence of short stature is more in males(50.5%) than females(49.5%).

Those gender-based prevalence rates lie within what has been reported in literature[14]

The 'Pro Child' study, which spanned 9 European countries, found lower prevalence rates of short stature of 1.4 and 2.8 % in 11 year old males and females, respectively [15]which disagreement with our study.

Another study from the West Bank reported rates of 9.2 and 7.3 % among 13–15 year old males and females, respectively [13]which agreement with our study.

One study in Saudi Arabia by [15] reported no significant difference in the prevalence of short stature between boys and girls (5–17 years of age).

Another study in Ankara, Turkey by [16] investigated the prevalence of short stature in 7–15 years school-aged children and also reported no gender differences regarding SS prevalence.

although New Damietta city is a new city with no rural area but there are rural areas at the periphery of the city whose children go to the city schools ,so included in our study.

as in our literature the incidence of short stature is more in rural(0.34%) area than urban area(0.22%).

this is agreement with occur in Jordan[12] with SS occurrence 7% in rural areas and 3.4% in urban areas.

In Brazil improving average socioeconomic status between 1975 and 2007 led to a reduction in the prevalence of short stature by more than 80 % (from 37.1 to 7.1 %)[17].

Another study from Saudi Arabia found higher prevalence in the incidence of short stature in the Southwestern region of Saudi Arabia compared to the rest of the country, citing the lower socioeconomic status of the area and its higher prevalence of malnutrition as possible causes[15].

A recent study conducted in England which held in 1213 child aged and 11-12 years concluded that social inequalities reflected on the height of the children included in the study[18].

regarding to the causes of short stature , we found in our study that familial short stature is the leading cause of short stature in primary school children in new Damietta city.

the second cause is growth hormone deficiency.

this is with agreement with the thesis held in Assuit government from May 2012 to December 2015[11] which held on 637 short children and the result show the incidence of familial short stature was 42% from studied cases followed by endocrinal causes by percentage 26%.

our study results regarding causes of short stature also agreement with the study held in Department of Paediatrics, Military Hospital, Rawalpindi and Combined Military Hospital, Multan from September 2004 to January 2007[19] on 240 short children which

found the familial short stature and constitutional growth delay is the leading cause by percentage 46% and the endocranial causes come in second place by percentage 16%.

another study done in Endocrinology Department, Institute of Medical Sciences, Kashmir, India held on 193 child in December 1988[20] result on growth hormone deficiency is the first cause of short stature by percentage 22.8% then familial short stature by percentage 18.7% which disagreement with our study as this study was retrospective study and done in inpatient children and not screening.

CONCLUSION

- this study confirm that the rate of occurrence of short stature more in males than females in school age children.
- our study showed that short stature is affected by the social class as rate of occurrence more at low socioeconomic classes than high one due to poor nutrition and more morbidity.
- chronic diseases as anemia is associated with high rate of occurrence of short stature.
- familial short stature is the leading cause of short stature in school age children in our study.

Recommendations

- increase awareness of physician of importance of early diagnosis and proper treatment of short stature.
- height measurement should be a mandatory part of children examination in general practice and pediatric clinics and in primary care units.
- early diagnosis and proper treatment of chronic diseases as anemia to prevent short stature occurrence in this cases.
- increase awareness of parents and school staff about importance of proper and adequate nutrition in school day.
- community efforts must be directed to improve socioeconomic state.

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