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A Cross Sectional Study of Stature and Weight in Down Syndrome Patients.

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ABSTRACT

In the present study an attempt is made to study stature and body weight measurements in the patients of Down syndrome, specifically by comparing with the age and sex matched control group. This study acts as a non-invasive tool for knowing the characteristic clinical features. The present study was conducted on 100 subjects of South Indian origin. Among these 50 were Down syndrome patients ranging from 0-18 years of age (30 males and 20 females) another 50 were age and sex matched controls. Regular growth surveillance of children with Down syndrome should aid early identification both of pathological causes of growth retardation and incipient overweight or obesity. Growth charts are recognized as a useful tool for monitoring the growth and well being of children. Down syndrome patients were characterized by short stature and had statistically significant increase in Body mass index than the controls.

Keywords: Anthropometry, down syndrome, Trisomy 21, Growth charts

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INTRODUCTION

Down syndrome (Trisomy 21) is one of the commonest chromosomal disorders occuring one in 650-1000 live births [1]. Patients with Down syndrome present with variable external and internal malformations. The wide range of morphological variations in normal population often makes it difficult to draw clear distinction between normal and abnormal findings. Anthropometry is a simple, non-invasive technique that circumvents these problems. There is a widespread agreement that this is the technique of choice for the evaluation of dysmorphic features [2]. It is estimated that about 95% of patients who are suspected of having the Down syndrome can be categorized as having or not having it with 99.9% confidence by anthropometric measurements [3].

As with the general population, height and weight Down syndrome patients vary from country to country. The present study was conducted on Down syndrome patients and controls of South Indian origin which emphasizes the importance of Syndrome specific growth chart in South India.

MATERIALS AND METHODS

Data Collection

For the present study 50 patients below 18 years of age group (30 males and 20 females) who were diagnosed as cases of Down syndrome were selected. Similarly 50 age and sex matched controls were selected. All the controls included in the study were healthy with adequate nutrition and did not have any congenital malformations. After taking consent from the parents or guardians, detailed history and general physical examination including stature and weight of the subjects was taken. All the patients with Down syndrome and controls were from South India.

Techniques

The height and weight measurements were taken after Singh and Bhasin [4] using anthropometer and weighing machine. All the measurements were taken by one observer in order to avoid inter-observer bias. Diurnal variations have been reported in the stature of an individual; thus all measurements were taken during afternoon hours to avoid diurnal variations [5].

Statistical Analysis

All the statistical calculations were performed using the software SPSS (Statistical Package of Software System) version 12.0.

RESULTS

When stature of the subjects was referred to standard pediatric growth charts [6] , it revealed that height in most of the Down syndrome children came under 3rd to 10th percentile and controls under 25th to 75th percentile. Independent samples t-test of Body Mass Index in Down syndrome patients and controls showed the following results as depicted in Table.1. Mean value of Body mass index in Down syndrome patients (24 Kg/m^2) with Standard Deviation of 5.19 was increased than mean value of controls (19 Kg/m^2) with Standard deviation of 2.36. This difference was found to be statistically significant ($P<0.05$). Degree of freedom was 98 and t value at 0.05 level of significance was 6.667.

Table 1: Independent samples t-test of body mass index in Down syndrome patients and controls.

Group	Mean (BMI)	S. D.	Degree of freedom	P value	Inference
Down syndrome	24	5.19	98	< 0.05	Significant
Control	19	2.36			

t-value at 0.05 level of significance is 6.667.

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DISCUSSION

Stature of Down syndrome Patients

Short stature is a recognized characteristic of most people with Down's syndrome. Average height at most ages is around the 2nd centile for the general population. For the majority the cause of growth retardation is not known. Some conditions leading to poor growth (congenital heart disease sleep related upper airway obstruction, coeliac disease, thyroid hormone deficiency, and nutritional inadequacy caused by feeding problems) occur more frequently among those with the syndrome [7].

Cronk [8] studied growth rate of Down syndrome children for 2 age intervals, 1-36 months and 2-18 years. They provided the data which corroborate other studies of growth in children with Down syndrome demonstrating deficient growth rate throughout the growing period.

Styles et al [7] stated that short stature was a recognized characteristic of most people with Down syndrome. Average height at most ages were around 2^{nd} centile for the general population.

Farkas et al [9] performed cross sectional study in 3 age categories in 115 Down syndrome patients in 1-36 years old. In age group 1 (1-5 years) the frequency of normal body height (20.7%) in both sexes was significantly less than subnormal (70.3%) but significantly decreased in age group 2 (6-15 years). Mean height in group 3 (16-36 years) was enough to rule out short stature as a stigmata of Down syndrome.

The present study in which height of the Down syndrome children was between 3^{rd} to 10^{th} percentile and controls under 25^{th} to 75^{th} percentile is in concurrence with other studies proving that short stature is a recognized feature of Down syndrome patients.

Body Mass Index of Down Syndrome Patients

Cronk [8] found that Down Syndrome children have a tendency to be overweight beginning in late infancy and throughout the remainder of the growing years.

Myrelid et al [10] reported that mean birth weight was 3.0 kg for boys and 2.9 kg for girls. A body mass index (BMI) >25 kg/m2 at 18 years of age was observed in 31% of the males and 36% of the females.in Down Syndrome children.

In the present study Body Mass Index of Down Syndrome patients (24 Kg/m^2) was nearer to upper limit of normal range (as shown in Table. 2) which differs from the above mentioned studies in which BMI was more than 25 kg/m^2. However our study correlated with that of Styles et al [7] which states that people with the Down syndrome are not necessarily overweight in relation to their height.

Table 2: Classification of children according to BMI [11]

BMI	Inference
< 18.5	Malnourished
18.5 – 24.99	Normal
> 25	Obese

There is also a high prevalence of overweight/obesity, particularly in adolescence and adult life. As with the general population, weight is influenced by environmental as well as biological factors, and for most, preventive measures are both feasible and effective.

Studies have shown that Growth in children with Down syndrome (DS) differs markedly from that of normal children. The use of DS specific growth charts is important for diagnosis of associated diseases, such as coeliac disease and hypothyroidism, which may further impair growth. Regular growth surveillance of children with Down syndrome should aid early identification both of pathological causes of growth retardation and incipient overweight or obesity. Growth charts are recognized as a useful tool for monitoring the growth and wellbeing of children [7].

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CONCLUSION

Our anthropometric study indicated that majority of the children with Down Syndrome in South Indian population are of short stature (height age less than chronological age) with statistically significant increase in BMI than controls. Understanding growth and interpretation of growth data in various population studies is essential for monitoring and optimizing the health and well being of infants. Proper growth monitoring includes accuracy and precision in measurement as well as thorough assessment and interpretation of results. This is particularly important in early infancy during the period of greatest change and vulnerability.

REFERENCES

[1] Kulkarni ML. 2006. Genetic Disorders. IAP Textbook of Pediatrics. 3rd Edition. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
[2] Prema Lakshminarayana, Janardhan K, Hemalatha S David. Indian J Pediatr 1991;58: 253-258.
[3] Rex AP, Preus M. J Pediatr 1982;100(6):903-906.
[4] Singh IP, Bhasin MK. 1989, Anthropometry. Reprinted, Delhi: Kamla-Raj Enterprises.
[5] Tanuj Kanchan, Menezes Ritesh G, Moudgil Rohan, Kaur Ramneeth, Kotian MS, Garg Rakesh K. Forensic Sci Int 2008;179:241-245.
[6] Ghai OP, Piyush Guptha, Paul VK. 2004, Genetic Disorders. Essential Pediatrics. 6th Edition Revised. New Delhi: CBS Publishers and Distributors.
[7] Styles ME, Cole TJ, Dennis J, Preece MA. Arch Dis Childhood 2002;87: 104-108.
[8] Cronk C, Crocker AC, Pueschel, Shea AM, Zackai E, Pickens G, Reed RB. Pediatrics 1998;81(1): 102-110.
[9] Farkas LG, Katic MJ, Forrest CR. J Craniofac Surg 2002;13(5): 614-22.
[10] Myrelid A, Gustafsson J, Ollars B, Annerén G. Arch Dis Childhood 2002;87: 97-103.
[11] Park K. 2007, Epidemiology of chronic non-communicable diseases and conditions. In: Text Book of Preventive and Social Medicine. 19th Edition. Jabalpur: M/S Banarsidas Bhanot Publishers, pp. 333-334.