Anthropometric and body-mass composition suggests an intrinsic feature in Williams-Beuren syndrome

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Summary

Objective: Although considered a well-known condition, there is only one study describing the body composition among individuals with Williams-Beuren syndrome. The aim was to characterize the nutritional status in Brazilian individuals with this condition. **Methods:** Cross-sectional study was designed to evaluate clinical and nutritional data of 17 Brazilian patients. Z-scores for height, weight, body mass index, triceps and subscapular skinfold thickness, arm circumference, arm muscle area, arm fat area were calculated. Wilcoxon's test was used to investigate differences between the z-scores of the anthropometrical measures and zero. **Results:** Four children were considered stunted and two severely malnourished. The z-score mean value for height was –1.14 ± 1.00 (p-value = 0.004), for weight, –0.67 ± 1.19 (p-value = 0.0443), for arm circumference, –0.94 ± 1.14 (p-value = 0.0222), for triceps skinfold thickness, –0.59 ± 0.63 (p-value = 0.0042) and for arm fat area –0.67 ± 0.67 (p-value = 0.0061). **Conclusion:** Short stature seen in this series confirms a previous study describing this feature in a German population, which would suggest it as an intrinsic feature in Williams-Beuren syndrome. In addition, skinfold thickness measures have not been previously performed in this syndrome and detected abnormalities in fat stores in this sample. Considering this method a fast and low-cost way to evaluate body composition, similar studies could be performed in other populations in order to better characterize this issue. Morbidity related with this genetics condition and information for clinical investigation and clinical follow-up are also discussed.

Keywords: Natural history; nutritional status; body composition; Williams syndrome.

Resumo

Antropometria e composição de massa corporal sugerem achado intrínseco da síndrome de Williams-Beuren

Objetivo: Embora a síndrome de Williams-Beuren seja bem conhecida, há apenas um estudo descrevendo a composição corporal nesses pacientes. O objetivo foi caracterizar o estado nutricional de brasileiros com síndrome de Williams. **Métodos:** Utilizou-se um estudo transversal com a avaliação de dados clínicos e nutricionais de 17 pacientes. Foram calculados os escores-z do peso, estatura, índice de massa corpórea, dobras cutâneas, circunferência do braço e áreas muscular e adiposa do braço. Para verificar diferenças, foi utilizado o teste de Wilcoxon, sendo considerado significativo $p < 0,05$. **Resultados:** Os valores médios dos escores-z foram: –1,14 ± 1,00 (p = 0,004) para estatura, –0,67 ± 1,19 (p = 0,0443) para peso, –0,94 ± 1,14 (p = 0,0222) para a circunferência do braço, –0,59 ± 0,63 (p = 0,0042) para dobra cutânea do tríceps e –0,67 ± 0,67 (p = 0,0061) para a área gordurosa do braço. Foi observada desnutrição pregressa em quatro pacientes e crônica, em dois. **Conclusão:** A baixa estatura, semelhante à descrita na população alemã, parece ser intrínseca à síndrome. Esse foi o primeiro estudo que avaliou a composição corporal, utilizando as dobras cutâneas, e detectou anormalidades nas reservas de gordura. O método aqui utilizado é simples, rápido e de baixo custo, facilitando estudos similares em outras populações. Isso poderia melhor caracterizar esses aspectos na síndrome de Williams. Morbidade relacionada a essa doença e informações para investigação e seguimento clinico são discutidas.

Unitermos: História natural; estado nutricional; composição corporal; síndrome de Williams.

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Introduction

The improvement of health care along the years has been saving individuals, including those with genetic disorders, who have been experiencing an increase in their life expectancy. It brings the challenge to better understand the natural history of these conditions and planning a clinical follow up, which is essential for pediatric care. One of the well-known genetic disorders is the Williams-Beuren syndrome (WBS), with an estimate frequency of around 1:20.000[1]. It is a contiguous gene syndrome, i.e., it is caused by haploinsuficiency due to microdeletions in chromosome *7q11.23* involving the genes of *elastin LIM kinase 1*, and probably *RFC2* and *CYLN2*. Diagnosis can be confirmed by DNA analysis or fluorescent *in situ* hybridization (FISH) technique. Most cases are *de novo* occurrences, but occasionally, parent-to-child transmission is observed, as an autosomal dominant trait[2].

WBS is characterized by mental retardation, congenital cardiac defect (mainly supravalvular aortic stenosis), outgoing personality, and typical facies usually described as "elfin facies". A stellate iris pattern is also considered a typical feature of this disorder. Hypercalcemia has been an infrequent finding and can be detected only within the first months of life[2]. Other congenital abnormalities, as well as performance and growth deficiencies occur in variable degrees among affected individuals[3]. Although variable, short stature may occur in as many as 50% of the patients with the syndrome[4-6].

There are specific medical recommendations for management of these individuals[7], but knowledge about physiopathology still remains limited. There is only one previous study describing a characteristic body composition among these patients[8]. In this article, we present further body composition parameters in a different population of WBS, which could be important for a better understanding of this condition and also for pediatric management.

This study reports the anthropometrical findings in a sample of individuals with the diagnosis of WBS. In order to evaluate the stature and BMI status of Brazilian WBS, patients from two German WBS populations were used to compare the findings herein exposed.

Methods

Seventeen individuals with WBS were evaluated. Diagnosis was based on clinical criteria as shown on Table 1 and confirmed by FISH analysis (Vysis®). In fact, the Preus index is a score based on clinical observation in patients with WBS and it is an useful tool to determine further investigation for WBS. Typical facies were defined by the presence of periorbital fullness of subcutaneous tissues, anteverted nares, long philtrum, prominent lips, and open mouth. Individuals were considered to have the typical *facies* by three clinical geneticists with large experience in dysmorphology.

Table 1 – Main clinical findings detected in this sample based on Preus index modified by Sugayama[6]

Item	Points	Frequency	%
Delayed neuromotor development	2	17/17	100
Auditive hypersensitivity	1	16/17	94.1
Typical facies	3	16/17	94.1
Outgoing personality	3	15/17	88.2
Feeding problems	3	13/17	76.5
Low weight	1	12/17	70.5
Mental deficiency	3	12/17	70.5
Strabismus	2	10/17	58.8
Supravalvular aortic stenosis	3	10/17	58.8
Chronic constipation	3	9/17	53
Hypertension	1	5/17	29.4
Joint contractures	1	5/17	29.4
Other structural cardiac defect*	1	2/17	11.7
Ungueal hypoplasia	1	1/17	5.8

* pulmonary stenosis (2 individuals).

Outgoing personality was considered in individuals presenting an easy approach to strangers, a strong interest in others and a loquacious speech.

The cross-secctional study comprised the following steps: (a) identification, brief anamnesis and karyotype with FISH, (b) clinical and nutritional evaluation with anthropometrical measures including height and weight from the subjects and parents, as well as arm circumference, triceps and subscapular skinfold thickness from the subjects.

Anthropometrical data were measured by standard methods[9]. Weight was measured to 0.1 kg with a digital electronic stand on scale (PL 150, Personal Line, Filizola®) and stature was measured to 0.1 cm with a stadiometer. Skinfolds were measured in triplicate by at least two trained examiners with a Lange skinfold caliper (Beta Tech Inc, Cambridge, Maryland) and arm circumference with a flexible non-stretch fiberglass tape.

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Data analysis

National Center for Health Statistics reference standards (NCHS)[10] were used to calculate z-scores (standardized scores) for height, weight and body mass index (BMI). BMI was calculated by dividing weight (in kilograms) by height squared (in meters).