OBESITY AND ABDOMINAL FAT IN ADULTS WITH ACHONDROPLASIA

Inês Alves[1]; Orlando Fernandes[1]; Maria António Castro[2]; Sofia Tavares[3]; Cidália D. Pereira[4,5]

[1] Comprehensive Health Research Centre; School of Sport and Health, University of Évora.

[2] School of Health Sciences of Polytechnic Institute of Leiria; RoboCorp lab, i2a – IPC; CEMMPRE University of Coimbra

[3] School of Social Sciences, University of Évora

[4] School of Health Sciences, Polytechnic Institute of Leiria

[5] ciTechCare - Center for Innovative Care and Health Technology

INTRODUCTION

Skeletal dysplasias are rare bone conditions of genetic origin, of an heterogenous group of 771 forms, being short stature a common feature. Achondroplasia is one of the more frequent skeletal dysplasias with a prevalence of 1:25.000 [1]. It is characterized by disproportionate short stature with shortening of the lower as well as the upper limbs with an average trunk length [2]. Adult standing height is -6.0 standard deviation score, which translates in less 45 cm (men) and 40 cm (women) in heigh comparing to the general population [3]. The skeletal features affect physical functioning and tend to originate multiple medical complications including neurologic compression as in the spinal canal, hyperlordosis, joints hyperlaxity, genu varus [4] and obstructive breathing [2]. These complications are aggravated by obesity, highly prevalent in achondroplasia.

AIM

Identify adjusted measures to evaluate obesity and abdominal fat in adults with achondroplasia

Anthropometry is a simple and reliable form to obtain objective information about a person's nutritional status. The Body Mass Index (BMI) is widely used as a body classification system to estimate total body fatness and is calculated weight-to-height squared (kg/m^2) index [5]. However, as this ratio considers standing height which is heavily impaired in achondroplasia and does not consider body shape neither fat distribution, is important to identify an adjusted index for achondroplasia to correctly define underweight, overweight and obesity in this population

METHODOLOGY

In a sample of 10 adults with achondroplasia, 6 women and 4 men, were obtained anthropometric measurements and body segmental composition using a TANITA 780 MA bioimpedance scale.

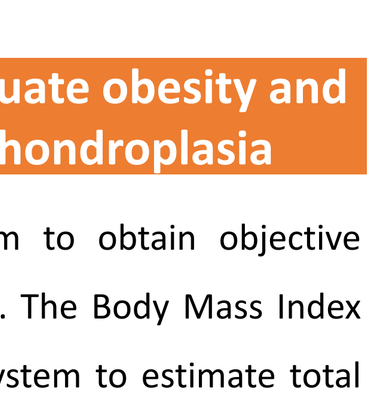

Figure 1. TANITA scale

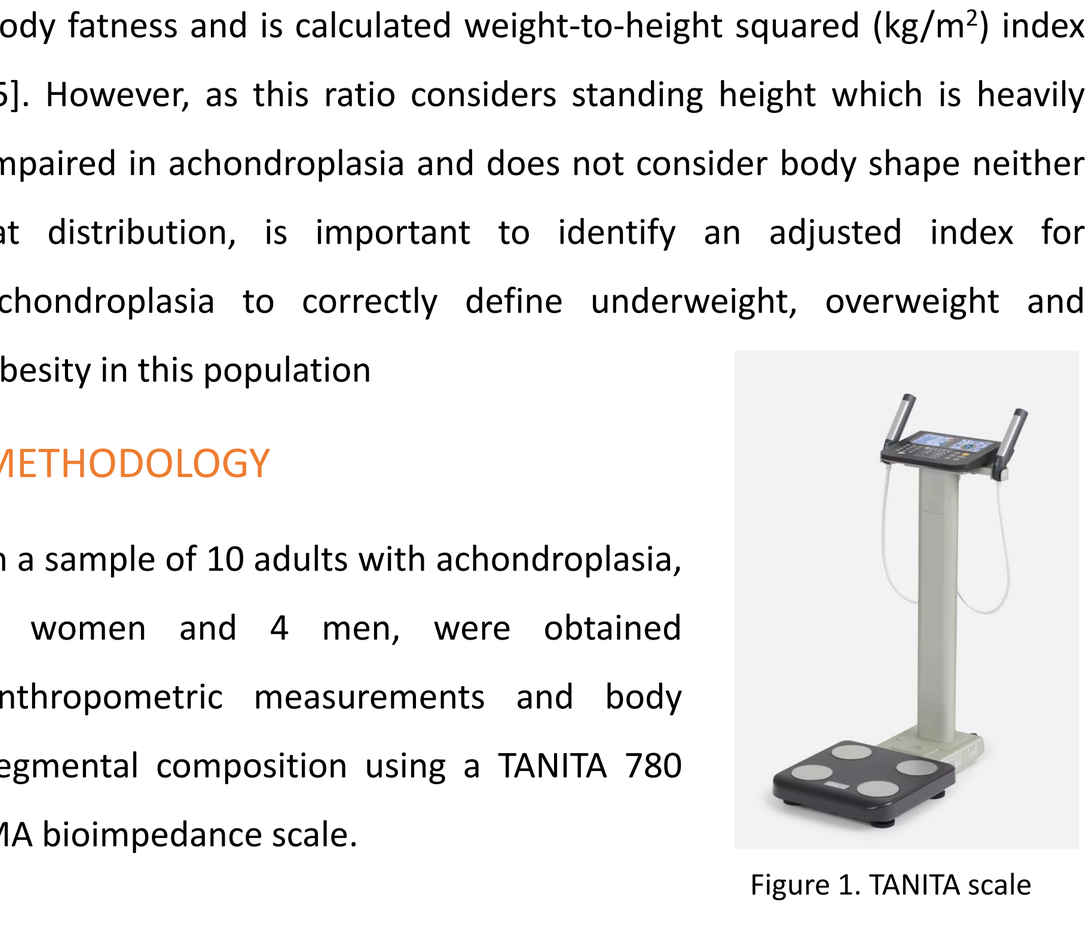

Figure 2. Standing and sitting height measurement in a female study participant

Figure 3. Waist and hip circunference measurement in a female participant

RESULTS

Table 1. Characteristics of the study participants (N=10).

	Men (n=4)	Women (n=6)
Age (years)	41.8 (±15.1)	41 (±16.1)
Height (cm)	122 (±8.46)	117 (±7.49)
BMI (kg/m^2)	42 (±13.3)	34.5 (±7.83)
Waist to hip ratio (WHR)	0.91 (±0.06)	0.78 (±0.04)
Increased waist (%)*	50	50
BMI 30-39 kg/m^2 (%)	25	50
BMI ≥ 40 kg/m^2 (%)	50	16.7

Age, Height, BMI and WHR are described as mean (standard deviation). BMI: body mass index.

*Percentage of waist above 80 cm for women and 94 cm for men was considered.

Considering the disproportionate short stature and consequent limitations of BMI in this population, an alternative index, the Trunk Fat Mass Index (TFMI) was evaluated.

Trunk fat mass index

Trunk fat mass (kg) / sitting height (m^2)

Men (n=4)	Women (n=6)
23,75 kg/m^2 (±11,67)	5,21 kg/m^2 (±4,87)

Results are expressed as mean ± standard deviation

Table 2. Correlations between anthropometric measures and Trunk Fat Mass Index

Measurements	Correlations (correlation coefficient)
WHR	Trunk fat mass (0.803)*
Fat mass	Hip circumference (0.930)**
	Waist circumference (0.968)**
TFMI	Trunk fat mass (0.996)**
	Waist circumference (0.878)**
	Fat mass (0.876)**
	WHR (0.808)#

CONCLUSIONS

High cardiovascular risk is associated with BMI >30 kg/m^2, yet BMI is not an adequate analysis as it overestimates fat in adults with achondroplasia. The waist circumference and WHR are height independent and can easily be evaluated, yet for more precise assessment and fat distribution, alternative indexes should be developed. Our preliminary results showed that TFMI has a high correlation with trunk fat mass, waist circumference, total fat mass and WHR in adults with achondroplasia. Further studies should be conducted to validate this index for obesity in achondroplasia.

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