Body satisfaction and lipodystrophy characteristics in HIV/AIDS children and teenagers undergoing highly active antiretroviral therapy

Satisfação corporal e características de lipodistrofia em crianças e adolescente com HIV/AIDS em uso de terapia antirretroviral de alta potência

Satisfacción corporal y características de lipodistrofia en niños y adolescentes con HIV/SIDA en uso de terapia antirretroviral de alta potencia

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ABSTRACT

Objective: To verify the presence of body and metabolic alterations as well as body satisfaction in children and teenagers undergoing antiretroviral therapy.

Methods: This cross-sectional study enrolled 38 HIV infected young individuals (aged six to 18 years old) treated from December 2009 to May 2010). The body satisfaction was assessed by the silhouette rating scale with 11 figures. The nutritional status was assessed by weight, height, circumferences and skinfolds. The presence of lipodystrophy characteristics was determined by the physical exam, and lipid profile and glycemia were requested during consultation. The statistical analysis used t-test and chi-square test, being significant $p<0.05$.

Results: Most of the 38 patients were eutrophic with length adequate for age; 26% of them presented overweight/obesity. The total cholesterol was within the normal range in 29% of the sample. The most expressive changes were cheek and abdominal lipohypertrophy. The body dissatisfaction prevalence was 84%. Children and teenagers had similar dissatisfaction levels; however, those dissatisfied by an excessive body weight had higher mean body mass index and tricipital skinfold thickness than the satisfied ones. The dissatisfaction was not associated with the presence of lipodystrophy.

Conclusions: The prevalence of body dissatisfaction in these patients was not associated with lipodystrophy and was similar to the reported by healthy individuals. However, the morphological and biochemical alterations need multi-professional attention in order to decrease the risk of new diseases in HIV patients.

Key-words: nutritional status; highly active antiretroviral therapy; body image; child; adolescent.

RESUMO

Objetivo: Verificar a presença de alterações metabólicas e corporais e satisfação corporal em crianças e adolescentes em uso de terapia antirretroviral.

Métodos: Estudo transversal de 38 jovens entre seis e 18 anos infectados por HIV e atendidos entre dezembro de 2009 e maio de 2010. A satisfação corporal foi avaliada por escala de silhuetas, composta por 11 figuras. O estado nutricional foi avaliado por meio de mensurações de peso, altura, circunferências e pregas cutâneas. A presença de características de lipodistrofia foi avaliada pelo exame físico e o perfil lipídico e glicêmico foi solicitado no dia da consulta. Na análise estatística, aplicou-se o teste *t* e do qui-quadrado, sendo significante $p<0,05$.

Resultados: A maioria dos 38 jovens era eutrófica, com estatura adequada para idade, e 26% apresentavam sobrepeso/obesidade. O colesterol total esteve adequado em 29% dos pacientes. As mudanças corporais mais expressivas foram a lipo-hipertrofia na face e na região abdominal. A prevalência de insatisfação corporal foi de 84%. Crianças e adolescentes

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apresentaram níveis de insatisfação semelhantes; no entanto, as insatisfeitas com o excesso de peso mostravam valores médios mais elevados de índice de massa corporal e prega cutânea tricipital do que os satisfeitos, porém sem relação com a presença de lipodistrofia.

Conclusões: A prevalência de insatisfação corporal nesta amostra não se associou com a lipodistrofia e foi semelhante à de indivíduos saudáveis. No entanto, as alterações morfológicas e bioquímicas requerem atenção das equipes multiprofissionais, de modo que se possam diminuir os riscos de novas enfermidades nos pacientes avaliados.

Palavras-chave: estado nutricional; terapia antirretroviral de alta atividade; imagem corporal; criança; adolescente.

RESUMEN

Objetivo: Verificar la presencia de alteraciones metabólicas y corporales y su satisfacción corporal en niños y adolescentes en uso de terapia antirretroviral.

Métodos: Estudio transversal de 38 jóvenes entre 6 y 18 años infectados por HIV y atendidos entre diciembre/2009 y mayo/2010. La satisfacción corporal fue evaluada por la Escala de Siluetas, compuesta por 11 imágenes. El estado nutricional fue evaluado mediante mediciones de peso, altura, circunferencia y pliegues cutáneos. La presencia de características de lipodistrofia fue evaluada por el examen físico y el perfil lipídico y glucémico fueron solicitados el día de la consulta. En el análisis estadístico, se aplicó la prueba t y el chi cuadrado, siendo significante $p<0,05$.

Resultados: La mayoría de los 38 jóvenes era eutrófica, con estatura adecuada para la edad, y 26% presentaban sobrepeso/obesidad. El colesterol total estaba adecuado en 29% de los pacientes. Los cambios corporales más expresivos fueron lipohipertrofia en la cara y región abdominal. La prevalencia de insatisfacción corporal fue de 84%. Niños y adolescentes tuvieron niveles de insatisfacción semejantes; sin embargo, los insatisfechos con el exceso de peso mostraban valores medianos más elevados del índice de masa corporal y pliegue cutáneo tricipital que los satisfechos, pero sin relación con la presencia de lipodistrofia.

Conclusiones: La prevalencia de insatisfacción corporal en esta muestra no tuvo asociación con la lipodistrofia y fue semejante a la de individuos sanos. Sin embargo, las alteraciones morfológicas y bioquímicas requieren atención de los equipos multiprofesionales, de modo que se pueda reducir los riesgos de nuevas enfermedades en los evaluados.

Palabras clave: estado nutricional; terapia antirretroviral de alta actividad; imagen corporal; niño; adolescente.

Introduction

The predominance of heterosexual transmission of the human immunodeficiency virus (HIV) has led to an increase in the number of infected women. Consequently, vertical transmission is now one of the foremost modes of HIV dissemination, and the number of infected children has risen substantially[1].

The advent of highly active antiretroviral therapy (HAART) changed the natural history of HIV infection, decreasing mortality and slowing disease progression in people living with the disease[2]. Nevertheless, several negative aspects of this therapy have been observed, including lipodystrophy, which is characterized by changes in body fat distribution (lipoatrophy and lipohypertrophy)[3]. The most common sites affected by lipodystrophy are the face, extremities, buttocks, abdomen, and cervicodorsal area[4]. In addition to its effect on fat distribution, antiretroviral therapy appears to be a determining factor for the development of lipid profile and blood glucose changes[5].

Changes in appearance can have significant impacts on psychosocial welfare and quality of life[6], including negative body image perceptions, social isolation, poor self-image, and mood changes[7].

In light of these findings, the present study was conducted to test the hypothesis that children and adolescents on antiretroviral therapy develop body image dissatisfaction in the presence of lipodystrophy. Therefore, the objectives of this study were to ascertain the prevalence of body image satisfaction among children receiving HAART for HIV/AIDS, as well as assess the presence of metabolic and body composition changes and correlate these changes with nutritional status.

Methods

This cross-sectional study enrolled a sample of children and adolescents with HIV/AIDS seen at the Pediatric Infectious Diseases Clinic of the Hospital Universitário de Santa Maria, in Santa Maria, state of Rio Grande do Sul, Brazil, between December 2009 and May 2010.

The criteria for inclusion were age between 5 and 19 years and current antiretroviral therapy of at least 5 months' duration. Criteria for exclusion were mobility and/or speech and/or hearing impairments that might hinder administration of the study questionnaire. The presence of lipodystrophy-associated changes was diagnosed by a duly trained physician during targeted

physical examination. The changes in body fat distribution considered relevant for the purposes of this study were: central lipohypertrophy (fat buildup in the trunk and/or abdomen, breasts, or posterior cervical area, commonly known as "buffalo hump"); peripheral lipoatrophy (loss of fatty tissue in the face, anterior and lateral cervical area, lower and/or upper extremities, or buttocks); and mixed lipodystrophy (coexistence of both lipoatrophy and lipohypertrophy to varying degrees).

Blood work (fasting blood glucose; total, HDL, and LDL cholesterol; and triglycerides) was ordered on the day of the interview. Body weight was measured with a 150-kg capacity, 0.1-kg resolution scale (Filizola) and height was measured with a portable stadiometer (Cardiomed). Both measurements were obtained with subjects standing barefoot and lightly clothed, heels touching, back straight, and arms at side of body.

Nutritional status was assessed on the basis of BMI-for-age and height-for-age[8] (≥3rd percentile), waist and arm circumference, and biceps, triceps, and suprailiac skinfold thicknesses. All measurements were obtained in duplicate, non-consecutively, by a duly trained examiner.

Waist circumference (defined as the smallest girth) was measured with precision anthropometric tape (0.1mm scale). Arm circumference was measured with the technique recommended by Frisancho[9]. Skinfold thickness measurements were obtained with a Cescorf® skinfold caliper in accordance with the methods described by Lohman, Roche and Martorell[10]. Body image satisfaction was graded on a figure rating scale, previously validated by Kakeshita *et al*[11], which comprises 11 silhouettes of persons of both genders, ranging from extremely thin to extremely large, but all of similar height. Participants were asked to select the figure they considered most compatible with their nutritional profile and that which best indicated the body image they would like to have. Body dissatisfaction was defined as the difference between the figures selected by the participant.

The present study was approved by the *Centro Universitário Franciscano* (UNIFRA) and *Hospital Universitário de Santa Maria* (HUSM) institutional review boards (judgment no. 363.2008-2) and was conducted in accordance with National Health Council Resolution 196/96, which regulates human subject research. The parents and/or legal guardians of all participants provided written informed consent prior to any study procedure.

Data were expressed as simple descriptive statistics (means, standard deviations and relative frequencies). The chi-square test was used for between-group comparisons (with *vs* without lipodystrophy) for assessment of body image dissatisfaction and nutritional status. The Student *t* test was used for comparison of metabolic profiles and nutritional status parameters, after confirming normal distribution with the Kolmogorov-Smirnov test. The significance level was set at $p<0.05$. Statistical analyses were performed in the SPSS 15.0 software environment.

Results

A total of 38 participants aged 6 to 18 years (mean age, 9.9±3.0 years) were assessed. Males accounted for 42.1 % (n=16) and females for 57.9% (n=22) of the sample. Overall, 47.4% (n=18) of participants were children and 52.6% (n=20) were adolescents. Mean duration of antiretroviral therapy was 77±41 months (range, 5.4–155.7 months; median, 76 months).

Most participants had BMIs within normal range (n=28; 73.7%). Stratification of the sample by age showed a higher prevalence of normal weight among adolescents and a higher weight of overweight and obesity among children. Nearly one quarter of participants (23.7%) were under height for age.

Of the metabolic markers assessed, total cholesterol was most often outside normal limits; levels were within the desirable range in approximately one-third of the sample (n=11; 28.9%). The only statistically significant difference, however, was found on comparison of triglyceride levels between different age groups. Adequate triglyceride levels were more prevalent in children (n=12; 66.7%) whereas the majority of adolescents had borderline high levels (n=9; 45.0%).

In terms of body image satisfaction, children were mostly dissatisfied due to overweight or obesity and adolescents due to leanness, although no statistically significant difference was found on comparison between the two age groups (Table 1). Between-gender comparison of dissatisfaction rates (Table 2) showed a higher prevalence of dissatisfaction due to perceived leanness among males (n=8; 50%), whereas females were more likely to be dissatisfied due to overweight (n=11; 50%). Again, however, the difference was not significant. Attempts to correlate nutritional status with body image satisfaction (Table 3) showed that participants who were dissatisfied due to overweight were significantly more likely to have higher BMI ($p=0.025$) and increased triceps skinfold thickness ($p=0.016$) when compared to those dissatisfied due to leanness.

Assessment of the manifestations of lipodystrophy in the sample (Table 4) showed that abdominal and facial lipohypertrophy were the most prevalent changes. There were no major changes in fat distribution in areas such as the arms, thighs, and buttocks. Changes in fat distribution were similar in children and adolescents.

None of the manifestations of lipodystrophy assessed in this sample—facial atrophy, abdominal fat buildup, and cervicodorsal lipohypertrophy (buffalo hump deformity)—were significantly associated with body image dissatisfaction (p=0.328, 0.384, and 0.412 respectively) (Table 5).

Discussion

From a biomedical standpoint, AIDS is no longer regarded as an acute condition, but rather as a chronic illness. Therefore, new management issues are now emerging, with particular emphasis on the adverse effects of long-term antiretroviral therapy and on the frequency and consequences of a syndrome characterized by abnormal redistribution of body fat, changes in glucose metabolism, insulin resistance, and dyslipidemia. The advent of antiretroviral therapy has redefined the bodily changes experienced by these patients, particularly in regard to their perceptions and experiences of lipodystrophy[12]. It remains to be seen whether these changes occur in youth as well, as no studies have addressed this topic thus far.

Table 1 - Nutritional status, biochemical profile, and body image satisfaction of children and adolescents seen at the Hospital Universitário de Santa Maria Pediatric Infectious Diseases Clinic, Santa Maria, Rio Grande do Sul

	Children		Adolescents		Total		p
	n	%	n	%	n	%	
Nutrirional status							
BMI							
Normal weight	12	66.7	16	80.0	28	73.7	
Overweight/obesity	6	33.3	4	20.0	10	26.3	0.29
Height-for-age							
Adequate	14	77.8	15	75.0	29	76.3	
Low	4	22.2	5	25.0	9	23.7	0.57
Biochemical analyses							
Total cholesterol							
Normal	5	27.8	6	30.0	11	28.9	
Borderline high	5	27.8	6	30.0	11	28.9	
High	8	44.4	8	40.0	16	42.2	0.96
HDL cholesterol							
Optimal	10	55.6	8	40.0	18	47.4	
Suboptimal	8	44.4	12	60.0	20	52.6	0.26
LDL cholesterol							
Normal	11	61.1	12	60.0	23	60.5	
Borderline high	3	16.7	7	35.0	10	26.3	
High	4	22.2	1	5.0	5	13.2	0.20
Triglycerides							
Normal	12	66.7	7	35.0	19	50.0	
Borderline high	2	11.1	9	45.0	11	28.9	
High	4	22.2	4	20.0	8	21.1	0.05
Fasting blood glucose							
Normal	17	94.4	20	100.0	37	97.4	
Impaired glucose tolerance	1	5.6	-	-	1	2.6	0.47
Body satisfaction							
Satisfied	2	11.1	4	20.0	6	15.8	
Not satisfied (feels underweight)	7	38.9	9	45.0	16	42.1	
Not satisfied (feels overweight)	9	50.0	7	35.0	16	42.1	0.60
Total	18	47.4	20	52.6	38	100	

BMI: body mass índex.

Table 2 - Body image satisfaction of children and adolescents seen at the Hospital Universitário de Santa Maria Pediatric Infectious Diseases Clinic, Santa Maria, Rio Grande do Sul, according to gender

Body satisfaction	Gender		Total
	Male	Female	
	n (%)	n (%)	n (%)
Satisfied	3 (18.8)	3 (13.6)	6 (15.8)
Not satisfied (feels overweight)	5 (31.2)	11 (50.0)	16 (42.1)
Not satisfied (feels underweight)	8 (50.0)	8 (36.4)	16 (42.1)
Total	16 (100.0)	22 (100.0)	38 (100.0)

Chi-square test; *p*=0.50.

Table 3 - Nutritional status and body image satisfaction of children and adolescents seen at the Hospital Universitário de Santa Maria Pediatric Infectious Diseases Clinic, Santa Maria, Rio Grande do Sul (variables expresses as mean±standard deviation)

	Not satisfied with weight		Satisfied	p
	Feels underweight	Feels overweight		
Age (y)	9.6±3.1	9.63±3.1	11.3±3.1	0.46
Body weight (kg)	29.7±8.6	34.4±14.2	36.6±12.8	0.38
Body mass index (kg/m²)	16.9±2.2	19.2±2.5	17.9±1.6	0.03
Waist circumference (cm)	61.7±6.1	66.1±8.3	64.4±5.6	0.23
Arm circumference (cm)	18.8±3.0	20.8±3.6	19.7±2.8	0.24
Triceps skinfold (mm)	8.4±2.5	10.9±3.2	7.6±2.1	0.02
Biceps skinfold (mm)	5.6±4.9	5.1±1.5	3.0±0.97	0.27
Suprailiac skinfold (mm)	6.4±4.1	10.8±7.2	6.2±2.6	0.06

Table 4 - Changes in body weight distribution among children and adolescents seen at the Hospital Universitário de Santa Maria Pediatric Infectious Diseases Clinic, Santa Maria, Rio Grande do Sul

	Children		Adolescents		Total		p*
	n	%	n	%	n	%	
Face							
Increased	5	27.8	6	30.0	11	28.9	
Decreased	2	11.1	4	20.0	6	15.8	
Normal	11	61.1	10	50.0	21	55.3	0.70
Abdomen							
Increased	14	77.8	12	60.0	26	68.4	
Decreased	-	-	-	-	-	-	
Normal	4	22.2	8	40.0	12	31.6	0.21
Arms							
Increased	2	11.1	-	-	2	5.3	
Decreased	6	33.3	3	15.0	9	23.7	
Normal	10	55.6	17	85.0	27	71.0	0.09
Buttocks							
Increased	-	-	2	10.0	2	5.3	
Decreased	1	5.6	2	10.0	3	7.9	
Normal	17	94.4	16	80.0	33	86.8	0.32
Thighs							
Increased	1	5.6	1	5.0	2	5.3	
Decreased	1	5.6	3	15.0	4	10.5	
Normal	16	88.8	16	80.0	32	84.2	0.64
Total	18	47.4	20	52.6	38	100.0	

*Chi-square test.

Table 5 - Association between body image satisfaction and presence of lipodystrophy syndrome in children and adolescents

Lipodystrophy	Body image		Total	p*
	Satisfied	Not satisfied		
Facial atrophy				0.33
Absent	6 (19%)	26 (81%)	32 (100%)	
Present	0	6 (100%)	6 (100%)	
Abdominal				0.38
Absent	2 (11%)	16 (89%)	18 (100%)	
Present	4 (20%)	16 (80%)	20 (100%)	
Cervicodorsal				0.41
Absent	5 (14%)	30 (86%)	35 (100%)	
Present	1 (33%)	2 (67%)	3 (100%)	
Total	6 (16%)	32 (84%)	38 (100%)	

In the present study, approximately half of all participants were dissatisfied with their body image, whether due to overweight or to leanness. The high prevalence of dissatisfaction was demonstrated among girls by overweight and among boys by leanness. Similar dissatisfaction data have also been reported by surveys of healthy children and adolescents in the same age range[13-17]. In these studies, body image dissatisfaction was present in 59 to 82% of participants; this rate may be age-related, as subjects in these age ranges express a substantial concern with body weight from a very early age[13]. The various methods used for body image assessment may also account for this variation.

The absence of any association between presence of lipodystrophy and body image dissatisfaction in this sample corroborates the assumption that people living with HIV follow the same pattern of body image dissatisfaction of healthy individuals of a similar age. It should be noted that the method employed in the present study assesses overall body image; the use of an assessment technique that provides for satisfaction with individual body parts might have detected some association between lipodystrophy and body image dissatisfaction. Furthermore, it bears stressing that, however apparent they may be to examining physicians, changes in body fat distribution are subtle and may not be major enough to be perceived by patients themselves (and, therefore, lead to dissatisfaction), particularly in younger populations. Conversely, high levels of self-perception of body fat changes have been reported in studies of adults living with HIV; this awareness is associated with a decline in the quality of relationships with friends, family, and sexual partners[18].

The presence of changes in body fat distribution—identified in the present study as mostly affecting the abdominal area, but having no impact on body image—is difficult to ascertain and assess, particularly in adolescents, as these changes do not occur exclusively as an adverse effect of HAART and may simply be associated with puberty[19,20]. As there is no reference standard for assessment of lipodystrophy, let alone in pediatric populations, diagnosis of the lipodystrophy syndrome is challenging and often based on subjective findings[4].

Studies have found increased buildup of abdominal fat in HIV-infected children, as shown by increased waist circumference in patients with lipodystrophy in the same age range as the participants of this study; this pattern of central obesity is associated with an increased prevalence of hypercholesterolemia[4,21-23].

The most common lipid profile abnormalities found in this study involved total cholesterol, HDL cholesterol and triglycerides; blood sugar changes were infrequent. These findings are similar to those reported by Werner, Fonseca and Chaves[24] and Aldrovandi *et al*[25] Altered glucose metabolism, which can be affected by coinfection with the hepatitis C virus, use of protease inhibitors, presence of lipodystrophy, and a family history of diabetes mellitus, among other factors, is more common in adults[26].

Regarding nutritional status, 74% of subjects assessed in the present study had BMIs within normal range, a rate similar to that reported by Werner, Fonseca and Chaves[24], in a cross-sectional survey of 43 HIV-positive Brazilian children and adolescents seen at an outpatient clinic. Conversely, Centeville *et al*[27] reported lower rates of normal weight in a retrospective longitudinal study of 119 Brazilian children living with HIV. Although the latter investigation reported a high prevalence of underweight, none of the participants of the present study were thin. Furthermore, 26% of individuals in our sample were overweight or obese, which signals a shift in the nutritional status pattern of HIV-infected children and adolescents towards one similar to that of their HIV-negative peers[28,29]. These data may also reflect the impact of regular clinical follow-up since birth, which contributes toward a reduction of underweight prevalence rates and helps ensure better management of conditions that could aggravate nutritional status. We did, however, find a high

prevalence of height-for-age deficit, possibly due to a prior history of malnutrition in our subjects. One Brazilian study found that approximately one-third of HIV-infected children have some form of growth restriction[30].

Despite the pioneering nature of this study as an assessment of body image satisfaction among children and adolescents receiving highly active antiretroviral therapy for HIV infection, several limitations should be stressed, including the lack of a control group, sample size, and the length of the data collection period. This is a case series, and should be regarded as a pilot study that can provide inputs for a more in-depth analysis of this important topic.

In short, we conclude that the children and adolescents living with HIV/AIDS assessed in this study exhibited high rates of body image dissatisfaction, but this dissatisfaction was not associated with the presence of manifestations of lipodystrophy. Comparison of our findings to previously published data shows that the body image dissatisfaction reported by the subjects of this study is similar to that of HIV-negative children and adolescents. Further notable findings include the substantial percentage of overweight and obese subjects, the prevalence of increased abdominal fat, and the low prevalence of normal serum cholesterol levels. These findings signal a series of subtle changes that warrant careful attention on the part of health professionals, so that strategies may be developed to reduce the adverse long-term consequences of this nutritional shift and thus contribute to improved future quality of life among HIV-infected children.

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