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Lipodystrophy and body image in physically active and sedentary HIV-infected patients

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Research into how people living with HIV experience body changes, such as lipodystrophy, is limited. On the other hand, physical activity has been recommended to improve the quality of life of these patients. ***Objectives****:* The study compared the body image-BI in lipodystrophic and non-lipodystrophic HIV-infected patients, sedentary and physically active. ***Methods:*** A total of 32 HIV-infected patients (age=45±2 yrs, body mass index-BMI=22.8±1.0 $kg.m^{-2}$; CD4+T=506.1±46.0 $cell.mm^{-3}$; CD4+T%=20.5±2.0%) were assigned into four groups: Lip-Sed (sedentary lipodystrophic; n=9); Lip-Act (physically active lipodystrophic; n=7); NLip-Sed (sedentary non-lipodystrophic; n=9); NLip-Act (physically active non-lipodystrophic; n=7). BI was assessed by means of the comparison between the actual BMI and self-reported actual silhouette-AS and ideal silhouette-IS. AS and IS were obtained using the Silhouette Matching Task-SMT, with 12 figures representing BMI from 17.5 to 37.5 $kg.m^{-2}$. We have also applied the Body Image Questionnaire-BIQ, which reflects the affective body perception. ***Results:*** The Lip-Sed showed lower IS compared to BMI and AS ($P>0.05$), which in turn were higher than in Lip-Act, NLip-Sed, and NLip-Act ($P>0.05$). On the other hand, BMI in NLip-Act was close to IS ($P>0.05$), but higher than AS ($P<0.05$). With regard to the BIQ, compared to the other groups Lip-Sed exhibited lower values for almost all the different traits, which probably led to a significantly lower perception for the overall 'social acceptance of the body' ($P<0.05$). ***Conclusion:*** The lipodystrophy was found to be negatively associated with BI tests in HIV-infected patients, whereas regular physical activity had a positive relationship with BI, especially in lypodystrophic subjects.

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Key Words: exercise; body composition; mental health; body image questionnaire; body mass index; psychology

INTRODUCTION

The current use of the highly active antiretroviral therapy (HAART) has provided an increase of life expectancy in patients infected with human immunodeficiency virus (HIV) (22). However, as the treatment of HIV-infection and Acquired Immunodeficiency Syndrome (AIDS) has become more successful and life expectancy has increased, other therapeutic concerns - such as metabolic disorders, including insulin resistance, hypercholesterolemia, and undesirable body composition changes - have been discussed (5).

On the other hand, HIV-infected patients suffer from multiple social stressors that may accelerate the progression of this disease. These conditions may be related either to the presence of events of an uncontrolled nature related to the disease (23) or to the reduced functional capacity related to the overall physical losses (31). Therefore, although life expectancy has increased, psychological problems seem to affect seropositive subjects and their quality of life (8).

One of the main sources of psychological distress in HIV/AIDS patients is related to changes in body composition, especially lypodystrophy (9,11). Before the HAART era, the main problems concerning body composition of HIV-infected patients were related to weight loss and sarcopenia, but more recently obesity, metabolic disturbances, and abnormal fat distribution have been identified (1). Lipodystrophy is a medical condition characterized by abnormal or degenerative conditions of the body's adipose tissue, and may be a

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possible side effect of HAART. It can manifest as lipid redistribution with either excess or lack of fat in various regions of the body. These include, but are not limited to, having sunken cheeks or 'humps' on the back or neck (also referred to as 'buffalo hump') (14,24,33).

Evidently this condition may lead to disturbances in important aspects of the psychological well-being, such as self-perception and body image (20). In psychology, body image is defined as one's perceptions, beliefs, and emotional attitudes towards one's body, being an important determinant of mental health and quality of life (7). Dissatisfaction with body image in HIV-patients has been related to poor adherence to the treatment and overall psychological distress (2,20,34). On the other hand, non-pharmacological and alternative approaches have been enabled to help maintain the quality of life of HIV/AIDS patients. One of the most important therapeutic targets is now to keep the physical and functional fitness of these patients (8,10,35). Accumulated evidence indicates that HIV/AIDS patients enrolled in physical activities improve their fitness and functional capacity (8,10,33,35). However, current research somewhat neglects the psychological aspects of this practice. The few available studies have reported promising results, suggesting that regular exercise practice may be an interesting approach to deal with the psychological problems related to the HIV infection (13,25), but specific aspects of long term HIV-infection, especially after the introduction of the HAART, have not been investigated. Studies regarding this topic are important, since the side effects of the long term HIV-infection may result in relevant psychological disturbances.

In a few words, research into how people living with HIV or AIDS experience actual body changes, such as lipodystrophy, is limited. It is therefore important to evaluate the body image of subjects living with HIV-infections under HAART, with and without lipodystrophy diagnosis. Moreover, it would be useful to know whether performing physical activities on a regular basis affects the patients' body image. Thus, this present study aimed to compare the body image in lipodystrophic and non-lipodystrophic HIV-infected patients, sedentary and physically active.

METHODS

Subjects

The sample was composed of 32 HIV-infected patients (mean age=45±2 yrs, body mass index-BMI=22.8±1.0 $kg.m^{-2}$; CD4+T=506.1±46.0 $cell.mm^{-3}$; CD4+T%=20.5±2.0%), all assisted by physicians. Subjects were assigned into four groups: Lip-Sed (sedentary lipodystrophic patients, n=9; 6 men); Lip-Act (physically active lipodystrophic patients, n=7; 5 men); NLip-Sed (sedentary non-lipodystrophic patients, n=9; 5 men); NLip-Act (physically active non-lipodystrophic patients, n=7; 5 men). To be included in the study, subjects could not have had opportunistic diseases for at least three months and should have been treated with HAART for at least six months. Patients classified as physically active exercised regularly for at least 6 months in a supervised training program developed in our research facilities, including aerobic, strength, and flexibility exercises (3times/week; 90min/session). Sedentary patients agreed not to participate in regular physical activities for at least 12 months.

There is no conflict of interest related to the present study, which was approved by an institutional ethical committee. Written informed consent was obtained from all participants in accordance with the Declaration of Helsinki.

Procedures

In all groups, weight (kg) and height (m) were measured to determine the BMI ($kg.m^{-2}$). Although not adequate for the lipodystrophy diagnosis, the BMI is useful as an index of overweight or underweight in patients with advanced muscle loss. Also, the BMI has been demonstrated to be highly correlated with the self-perception of the body silhouette (15,40). The diagnosis of lipodystrophy was performed by the physicians who followed each patient, by direct consultation or review of medical records. Body image was assessed by two different approaches, and all tests were performed in a single blind fashion. The evaluators did not know the groups in which subjects were assigned to and were not aware of the purposes of the study.

The first analysis was made using the *Silhouette Matching Task* (SMT), originally developed by Stunkard (39). The original SMT consisted of 9 silhouettes. However, Marsh (26, 27) argued that the scale needed to be extended, so that there would be more differentiation between the two extreme ends of the scale, and thus developed a 12-figure scale representing BMI values ranging from 17.5 $kg.m^{-2}$ to 37.5 $kg.m^{-2}$. This 12-figure response scale was used in the present study. The silhouettes were showed to the subjects and the following questions were asked: a) Actual Silhouette - "Which silhouette best represents your actual physical appearance?"; b) Ideal Silhouette - Which silhouette represents the appearance you would like to have"? The individual level of satisfaction with the body image is reflected by the difference between the actual silhouette (AS) and the ideal silhouette (IS).

Table 1. Results obtained from the Silhouette Matching Task (referred actual silhouette-AS and ideal silhouette-IS) compared to the assessed body mass index (BMI)

Group	Body Mass Index (BMI) Mean±SD		Actual Silhouette (AS) Mean±SD		Ideal Silhouette (IS) Mean±SD	
Lip-Act	23.07	2.81	24.39	2.28	24.37	2.21
NLip-Act	22.09	3.02	19.45 $^{\Delta}$	2.81	23.03	2.15
Lip-Sed	26.20 *	3.80	26.57 *	2.55	23.40 $^{\Delta}$	2.19
NLip-Sed	22.41	2.57	23.81	2.63	22.34	2.14

Lip-Act: Patients with lipodystrophy and physically active; NLip-Act: Patients without lipodystrophy and physically active; NLip-Sed: Patients with lipodystrophy and sedentary; NLip-Sed: Patients without lipodystrophy and sedentary. *: Significant difference of a given test compared to the other groups ($P < 0.05$). Δ: Significant difference compared to the other tests within the same group ($P < 0.05$).

The Body Image Questionnaire (BIQ) proposed by Bruchon-Schweitzer was also applied (3). The BIQ evaluates body perception using an affective approach. The questionnaire is comprised of 19 items which are evaluated by the subject in a progressive 1 to 5 Likert scale. The results of the BIQ are interpreted according to four factors previously defined by multivariate statistics: a) Factor I ('*favorable vs. unfavorable body perception*'), opposing desire and not desire, youth and old age, tenderness and coldness, pleasure and disgust, energy-strength and frailty-weakness, joy and sadness ; b) Factor II ('*exposed vs. hidden body*'), opposing to touch and not to touch, to show and to hide, attractive and unattractive, eroticism and non eroticism, looked at and not looked at; Factor III ('*active vs. inactive body*'), opposing resistance and fatigue, masculinity and femininity, good health and bad health, energy-strength and frailty-weakness, courage and fear ; d) Factor IV ('*calm and nervous body*'), opposing tranquility and agitation, to show and to hide, looked at and not looked at, calm and anger, fullness and hollowness. In addition to these factors, a fifth trait called '*social acceptance of the body*' is calculated by adding the '*socially desirable responses*' (positive responses) to each item of the questionnaire (4).

Statistical Analyses

Data normality was tested by univariate analysis. Data for BMI and SMT were normally distributed, and therefore the comparison between groups for the results of these tests was performed by one-way ANOVA. This was followed by Fisher post hoc tests to determine pair wise differences when significant *F* ratios were obtained. The BIQ data did not satisfy the premises for parametric statistics. Hence the body image traits produced by BIQ were compared by means of the Kruskall-Wallis ANOVA, followed by the Mann-Whitney test as post hoc verification. In all cases, a probability level of $P \leq 0.05$ was adopted for statistical significance. The same statistical software was used for all calculations (Statistica^{TM} 6.0, Statsoft, OK, USA).

RESULTS

Table 1 exhibits the results for the SMT in all groups. The sedentary subjects diagnosed with lipodystrophy (Lip-Sed) showed higher BMI levels, which in general concurred with the referred AS. However, a good perception of the body silhouette was parallel to a clear dissatisfaction with the body image, as indicated by the significant lower value obtained for IS ($P < 0.05$). It is also worthwhile to notice that NLip-Act showed a BMI very close to IS, whereas the BMI associated with the chosen AS was significantly lower compared to the assessed BMI ($P < 0.05$).

The results obtained for the BIQ traits are presented in Figure 1. In general, subjects in Lip-Sed presented lower values for the different traits, which probably influenced the significantly lower perception of the '*social acceptance of the body*' ($P < 0.05$). In the non-lipodystrophic groups (NLip-Sed and NLip-Act), the physical activity was not related to possible differences in the affective perception of the body, as reflected by the BIQ. However, physically active subjects with lipodystrophy (Lip-Act) showed a body image similar to the groups diagnosed as non-lipodystrophic, regardless their physical activity level ($P > 0.05$).

Table 2 presents the values for the correlations between AS and IS discrepancy and the different BIQ traits. Significant differences were mainly detected in the lipodystrophic and sedentary groups, especially with regard to 'favorable vs. unfavorable perception' and 'social acceptance' of the body.

DISCUSSION

The present study compared the body image in physically active and sedentary HIV-infected patients

Table 2 - Correlations between Actual Silhouette and Ideal Silhouette discrepancy (IS *minus* AS) and the Body Image Questionnaire traits for the total sample and according the different subgroups (lipodystrophic *vs*. non- lipodystrophic and active *vs*. sedentary)

Group	Total	Act	Sed	Lip	NLip	NLip-Sed	NLip-Act	Lip-Sed	Lip-Act
fav-unfav	***0.40*** ***p=0.02***	0.35 *p*=0.22	***0.51*** ***p=0.03***	***0.54*** ***p=0.04***	0.12 *p*=0.64	0.24 *p*=0.53	0.12 *p*=0.80	***0.70*** ***p=0.05***	0.41 *p*=0.36
exp-hidden	0.21 *p*=0.26	0.04 *p*=0.89	0.38 *p*=0.12	0.24 *p*=0.39	0.05 *p*=0.83	0.09 *p*=0.82	-0.26 *p*=0.57	0.49 *p*=0.22	0.01 *p*=0.98
act-inact	0.28 *p*=0.13	0.24 *p*=0.41	0.36 *p*=0.15	0.42 *p*=0.12	0.05 *p*=0.87	-0.03 *p*=0.94	0.36 *p*=0.43	0.58 *p*=0.13	0.27 *p*=0.56
calm-nerv	0.15 *p*=0.43	0.07 *p*=0.82	0.26 *p*=0.31	0.08 *p*=0.77	0.15 *p*=0.57	0.35 *p*=0.06	-0.49 *p*=0.26	0.15 *p*=0.73	0.04 *p*=0.93
soc accept	***0.47*** ***p=0.01***	0.40 *p*=0.16	***0.60*** ***p=0.01***	***0.62*** ***p=0.01***	0.01 *p*=0.97	0.07 *p*=0.86	-0.14 *p*=0.77	***0.82*** ***p=0.01***	0.47 *p*=0.28

Lip-Act: Patients with lipodystrophy and physically active; NLip-Act: Patients without lipodystrophy and physically active; NLip-Sed: Patients with lipodystrophy and sedentary; NLip-Sed: Patients without lipodystrophy and sedentary; fav-unfav: '*favorable vs. unfavorable body perception'*; exp-hidden: '*exposed vs. hidden body*'; act-inact: '*active vs. inactive body*'; calm-nerv: '*calm and nervous body*'; soc accept: '*social acceptance of the body*'. The Pearson correlation and p-value are exhibited for each comparison. Significant correlations are in bold and italics.

with and without lipodystrophy. The main results revealed that lipodystrophic and sedentary patients showed worse body image than non-lipodystrophic subjects, despite their physical activity level. On the other hand, patients with lipodystrophy who were also physically active exhibited body image results similar to those without lipodystrophy. Discrepancies between AS and IS were particularly related to the perception regarding the social acceptance of the body within sedentary and lipodystrophic groups.

Very few studies aimed to specifically investigate the relationship between body image and lipodystrophy. However, it has been demonstrated that seropositive patients of both sexes have poor body image, possibly because of body composition changes (as lipodystrophy), but also due to the perception of others in relation to their status as HIV positive (16,18-20). Hence it is not surprising that, in general, body image indicators have been found to be low among HIV-patients (17), and that discrepancies between AS and IS reflected on a favorable or unfavorable perception of the body in lipodystrophic patients (See Table 2). Indeed, previous studies showed that seropositive patients commonly select as ideal a silhouette different from that which was chosen as representative of their actual body (6, 37).

It is therefore well accepted that HIV and lipodystrophy status are associated with unfavorable body image. However, we could not locate previous studies evaluating body image in HIV-infected patients with different physical activity levels. Actually, the only mention of a positive relationship between exercise and body image and HIV-infection was found in a preliminary validation study of an instrument developed by the World Health Organization to evaluate the quality of life of subjects living with HIV (30). Accumulated evidence supports the idea that exercise programs may improve the physical and functional fitness of HIV-infected patients, decreasing depressive symptoms and improving their perception of self-esteem and well-being (25, 28, 32). Therefore, it was expected that body image could also be favorably affected.

Our findings showed that this indeed seems to be the case. The group of sedentary patients with lipodystrophy exhibited higher BMI and AS. The BMI and AS values were somewhat close, revealing that the patients were aware of their condition. On the other hand, and concurring with previous research (6), the IS was lower than AS, denoting a dissatisfaction with the body image. Interestingly, the group of sedentary individuals without lipodystrophy showed similar

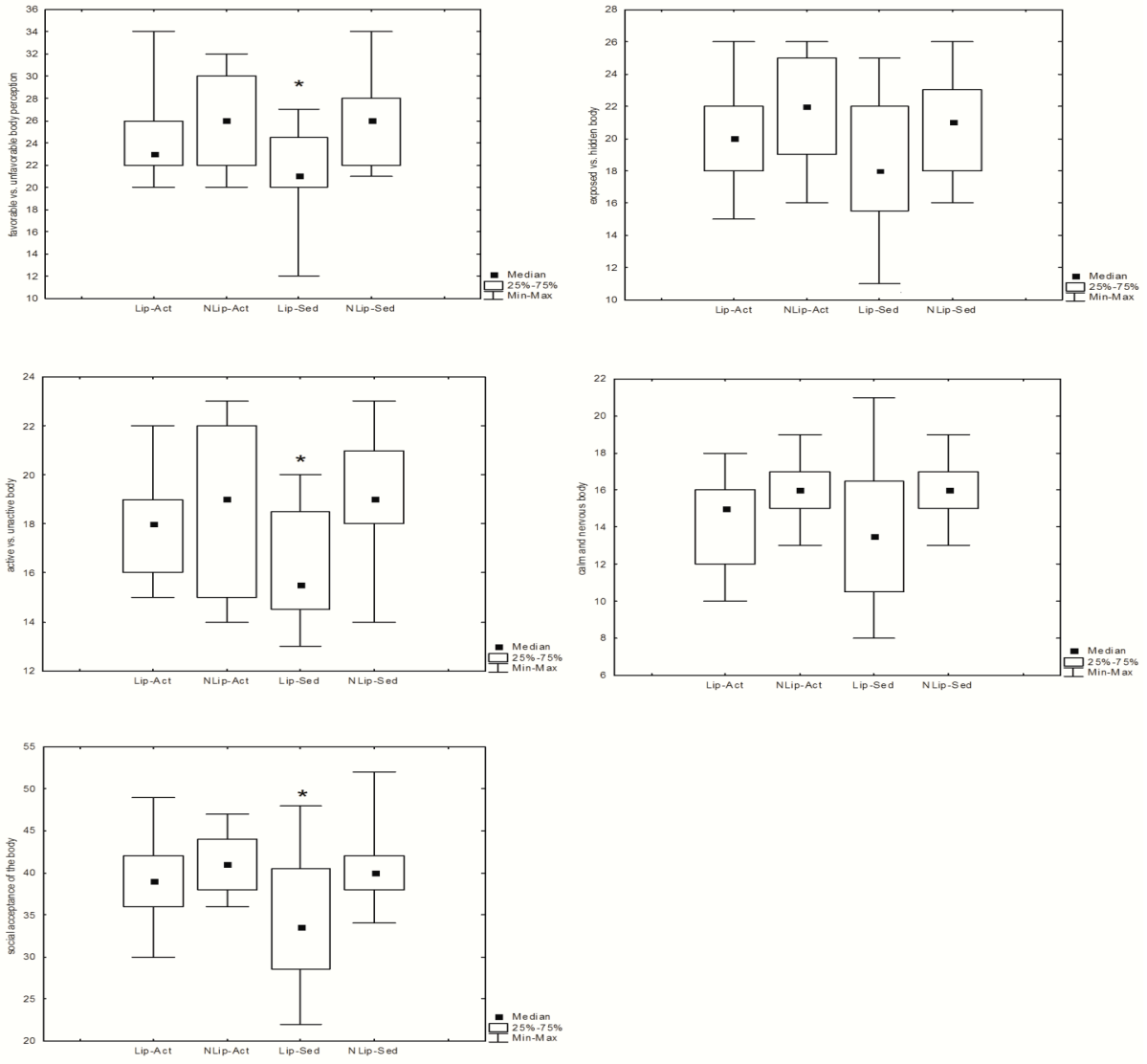

Figure 1. Results obtained from the 'Body Image Questionnaire'. Lip-Act: Patients with lipodystrophy and physically active; NLip-Act: Patients without lipodystrophy and physically active; NLip-Sed: Patients with lipodystrophy and sedentary; NLip-Sed: Patients without lipodystrophy and sedentary. *: Significant difference compared to the other groups ($P < 0.05$).

values for BMI and IS, whereas the AS was slightly higher, although no statistical difference was detected. This result means that they classified themselves as overweight and looked forward to have a body shape perfectly compatible with their actual body, which may be considered as indicative of both distortion and dissatisfaction with the body image. Moreover, significant correlations between discrepancies between AS and IS were detected in lipodystrophic and sedentary patients. On the other hand, such associations were not found in physically active patients, regardless of lipodystrophy.

In the group formed by physically active lipodystrophic patients no significant difference was found between the actual BMI and the current and ideal silhouettes; that is, those subjects exhibited a good perception of their silhouette, which was close to how they wanted it to be. Finally, in the physically active group without lipodystrophy, the actual BMI was very close to IS, and both were significantly higher than AS. This means that these patients underestimated their body image in relation to BMI, whereas expecting to exhibit a silhouette similar to their actual shape. This result could be associated with the fact that the non-lipodystrophic patients were thinner compared to those with lipodystrophy. Unfortunately, we could not find studies evaluating the body image under the perspective of excessive

thinness, which would be interesting since this is not a rare condition in HIV-patients (for instance, as in the wasting syndrome). It would be also useful to know whether physical active programs positively influence the body image in patients with advanced sarcopenia and weight loss, given that it has been demonstrated that exercise practice improves strength and muscle mass, regardless the age and sex (10, 12, 38).

The utilization of psychological instruments to evaluate general well-being in seroposive patients has been discussed. As mentioned, anxiety and depression may be related to dissatisfaction with changes in body composition, as well as with the fear of being rejected because of these changes. In this context, the results of the BIQ concerning the affective relationship with the body were appealing. It was evident that the groups with lipodystrophy had a poorer opinion about their own body, which was reflected in the significantly lower score for social acceptance of the body. This result concurs with other studies, demonstrating that a negative body image is usually concomitant with an overall low perception of well-being (21). On the other hand, in all cases this evident dissatisfaction was compensated by regular exercise practice, since no differences were detected between Lip-Act and the non-lipodystrophic groups. The influence of physical activity on the body image has been neglected and warrants future research on alternative strategies to improve the quality of life of people living with HIV.

The main limitation of the present study concerns the lipodystrophy diagnosis. Although it is well accepted that HIV-associated lipodystrophy can be diagnosed just from clinical examination, universal and clear criteria are yet to be defined. The available anthropometric and other non-invasive bedside methods are poorly validated and deserve further study (36). Nevertheless, this limitation was somewhat reduced since the lipodystrophy was diagnosed by physicians who followed the patients for a long time, and therefore had intimate knowledge of their clinical status.

In conclusion, the lipodystrophy correlated negatively to the body image in HIV-infected patients. Lipodystrophic subjects exhibited higher dissatisfaction with their silhouette and worse affective perception of their own body. On the other hand, the regular practice of physical activities was positively correlated with the body image. Lipodystrophic but physically active subjects showed higher satisfaction with their actual silhouette and responded similarly to an affective body image questionnaire, in comparison with non-lipodystrophic patients. These results warrant future research on the specific effects of physical activity on the perception of body image and well-being in HIV-infected patients.

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