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Body composition of individuals with heroin abuse problems

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SUMMARY

Few studies have investigated the body composition of adults with substance abuse problems. The present study was prompted by this lack of information. Our aim was to compare the body composition of adults with heroin abuse with reference norms for the healthy population. The sample size of the participants with SA was 98 males (*M* age = 28.4, *SD* = 4.6). All of them were registered in four therapeutic communities for drug rehabilitation. The results of this study indicate that heroin addicts have a lower weight, body mass index, and fat percentage. However, further research is needed.

Key words: Body composition – Heroin abuse – Rehabilitation – Therapeutic communities

INTRODUCTION

Heroin is one of the most damaging drugs in our society. However, the use, misuse, and abuse of a variety of chemical substances can affect one of the components of physical fitness; i.e. body composition (BC). In spite of the multidimensional nature of this psychiatric disorder, traditional treatment had generally focused on cognitive or social therapy and has tended to overlook physical therapy, fitness, exercise, physical self-esteem, and an active lifestyle (Fridinger and Dehart, 1993; Plante, 1996). A physically active lifestyle and good fitness are infrequent in individuals with heroin abuse (Bell et al., 1987; Lowenstein et al., 2000) or undergoing a drug treatment program (Kremer et al., 1995; Pimentel et al., 2000; Williams, 1993). The physical activities of the participants in the studies of Kaljner et al. (1984) and Kremer et al. (1995) were well documented and are as follows: walking, running, soccer, handball, basketball, body building, Jogging, relaxation, psychomotor therapy, dance, and swimming. Exercise, body composition and fitness may afford significant benefits relative to the prevention of substance abuse (SA), and may be an important component of a comprehensive treatment program for individuals with SA: improved mood, enhanced self-esteem and reduced anxiety (American College of Sport Medecine, 1997; Shepard, 1990; Winnick, 2000).

Promoting physical activity and good body composition is considered to be an important public health measure in industrial societies. To some extent, physical fitness is an objective marker for physical activity, and fitness can be measured more accurately than physical activ-

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ity (Blair, 1993). Health-related body composition evaluation in individuals with SA can be used for several purposes in exercise prescription (initial diagnosis) and monitoring, as well as for investigating the relationship between physical activity and health in population studies. However, little is known about the effects of drug addiction on body composition and about the fitness levels of individuals beginning a rehabilitation program. Describing and comparing the anthropometric measures of individuals with SA may uncover a decreased capacity that must be taken into account when devising physical activity programs in the different phases of rehabilitation (detoxification, methadone maintenance, therapeutic community or outpatient drug-free treatment).

Although the endurance, flexibility and strength of individuals with SA has been studied since 1990 (Ambits-Esport, 1996; Collingwood et al., 1991; Fridinger and Dehart, 1993; Palmer et al., 1995; Peterson et Johnstone, 1995), none of these studies takes into account all the components of physical fitness (including body composition) of the participants with SA. This may be because fitness, physical activity, body composition or active an lifestyle did not appeal to traditional researchers (physicians and psychologists). Furthermore, studies have tended to investigate only one component of physical fitness (maximum oxygen consumption) rather than overall physical fitness (endurance, strength, speed, flexibility, and body composition). For example, according to Shepard (1995) and Williams (1993) there is currently no convincing evidence that individuals with SA have lower physical fitness levels than the normal population. In fact, no comparison has been made between individuals with SA and the healthy population, taking gender and age into account has been reported. Because of the methods used in many of these studies aimed at investigating the physical fitness of individuals with SA (reduced samples, different tests, heterogeneity of participants, absence of psychometric properties, ...) and owing to the limited number of studies performed on individuals with SA compared to individuals without SA, it is difficult to conclude whether or not adult drug addicts have a low physical fitness level. None of the studies on physical fitness of individuals with SA examined test-retest correlations or intraclass reliability, and few have used adequate sample or control group.

A broad study of participants with SA was carried out in Spain (Ambits-Esport, 1996). This work, together with Riera's study (1998), form the basis of the present investigation. However, there are no comparative studies of individuals with and without SA, although Ambits-Esport's research (1996), which has not been published in English, selected some indicators and aspects of body composition (weight, height, body mass index, fat %). All participants (124 males and 36 females) were substance abusers (heroin and cocaine) and lived in the metropolitan area of Barcelona (Male *Mean* age = 28.1, *SD* = 4.9; Female *M* age = 30.4, *SD* = 12.2). One of the most interesting results of this study was the results of the measurements of fat percentage. In this investigation, females had higher values (19.5 %) than males (12.2 %). Riera et al. (1998), true pioneers in this area of investigation, measured the Body Mass Index (23.2 kg/m^2) and percentage of fat (12.5) in 363 males in a rehabilitation program. Peterson and Johnstone (1995) investigated the effectiveness of a physical activity program in a federal correctional institute in the United States. The sample in that work included 43 women, aged 24 to 63 (*M* age = 35). That study found that participants with SA, having danced an average of 2 hours per week for at least 9 months, exhibited a fat percentage of 34.6. Similar findings were reported by Collingwood et al., (1991). In this latter study, 74 adolescents (46 males and 28 females), both with SA and nonusers, were unfortunately grouped in one sample (*M* age = 16.8). The Fitnessgram physical fitness test was employed to evaluate this population. The fat percentage showed a significant decrease in pre-post fitness measures (20.9 to 18.5). Again, the results were not compared with a control group or nonuser peers. Palmer et al. (1995) investigated the effects of three types of structured exercise (aerobics, bodybuilding, and circuit training) on 45 (34 males, 11 females) individuals with SA (*M* age = 28 yr). None of the programs produced significant changes in the triceps skinfold.

The body mass index (B.M.I.) is easily determined from height and weight and is a good indicator of physical recovery in individuals with SA. A comprehensive study by Mc Combie et al. (1995) with drug injectors (192 males and 172 females) suggests that illicit drugs affect nutrient use which, together with the poor nutritional intake associated with a

drug-using lifestyle, may lead to different levels of nutritional deficiency. These and other studies (Ambits-Esport, 1996; Varela et al., 1997a, b; Zador et al., 1996) have reported that the B.M.I. of individuals with SA lies within normal parameters.

Lalín et al. (1999) reported that individuals with SA in TC (123 males, *M* age = 28.4; 17 females, *M* age = 26.5) have an endo-mesomorphic somatotype, with the mesomorphic component predominanting in males and the endomorphic component in females. None of the studies consulted took into account the waist-hip ratio and the relationship of this with a low risk of cardiovascular disease.

Overall, the above data suggest, however, that the body composition of individuals with SA is lower than that of normal peers, although the results presented were inconclusive because the sample populations were too small and because of the absence of a control group or nonuser peers. The amount of information concerning SA has increased progressively throughout the past decade, although not suffienciently so to diagnose first the level of body composition and then to prescribe exercise.

This lack of information prompted our research. The first step in a long term investigation consisted of evaluating the body composition of substance abusers. We then assessed fitness in different phases of rehabilitation process and, finally, analysed the contribution of a physical activity program. The purpose of this word was to examine the differents components of body composition (fat %, waist-hip ratio and body mass index) of individuals with SA and compare them with those recorded in a healthy population. We hypothesized that the body composition of the participants with SA would be significantly lower than in the case of nonusers.

Materials and Methods

Participants

Our goal was to measure all males with heroin abuse interned in the four therapeutic communities (residential drug treatment program) of Galicia (western Spain), who voluntarily participated in the investigation (Table 1). Only two subjects could not be evaluated because they had recently been hospitalized. In this phase of the rehabilitation program, the basic treatment program consisted of group and individual therapy, personal adjustment, domestic and working skills (cook, agriculture, gardening, etc). The residence time in these therapeutic communities (TC) is about nine months.

There were 98 male adults with substance addiction. Their mean age was 28.4 years (*SD* = 4.6, range = 18-39). All were characterized by a history of moderate-to-severe polysubstance abuse or dependence as determined by self-reported substance-use patterns, records reviews, and clinical assessment using DSM-IV criteria (American Psychiatric Association, 1995): F11.00 Heroin abuse [305.50]. Inclusion criteria were based on their injected drug use (primarily heroin). On admission, all participants were prescreened to diagnose any illness or medical contraindication to exercise. None of the participants were taking medication.

Table 1. Therapeutic indicators of participants.

Variables	*M* ± *SD*
Age (years)	28.4 ± 4.6
Heroin consumption time (years)	5.7 ± 3.6
Rehabilitation time (months)	23 ± 6
Cigarette smoking (per day)	17.7 ± 3.3

Procedures

The participants were evaluated at their own TC in four data collection sessions. All of them signed a consent form that was approved by the Faculty of Sciences of Physical Activity and Sport. This form is the Spanish version of the Revision of Physical Activity Readiness Questionnaire (PAR-Q) designed by Thomas et al. (1992).

Data were collected through the administration of the AFISAL-INEFC test battery (Rodríguez et al.,1998a). Informed consent, fat percentage, waist-hip ratio and B.M.I. were obtained at the clinical department of the respective TC. This test battery was designed for health-related physical fitness evaluation in adults according to the following criteria: validity, reliability, pertinence, safety, feasibility, and economy (Rodríguez et al., 1996). The AFISAL-INEFC test battery consists of several standardized physical fitness items. One of them involves anthropometric measurements: weight, height, skinfold (chest, abdomen and thigh) and perimeter (waist and hip). Some of these tests have been used previously in other batteries while others have been modified according to the mentioned criteria. The battery was tested

for reliability and feasibility by administering each test twice to 30 healthy adult volunteers aged 18 to 30 over a 15-day period (Rodríguez et al., 1996). Means differences were tested with Student's t test. Intra-observer test-retest reliability was analysed using a two-way ANOVA model and computing the intra-class correlation coefficient (ICC). The authors (Rodríguez et al., 1996) consider this test battery reasonably feasible and reliable to measure health-related fitness in young adults.

At the clinic, participants wore only shorts for height, weight and anthropometric measurements. Height was measured to the nearest millimeter using a stadiometer (Seca). Weight was measured to nearest 0.1 kg using an electronic digital scale (Seca). B.M.I. was calculated by dividing weight (kg) by the square root or height (m^2). The waist-hip ratio was calculated by dividing waist perimeter by hip perimeter. Body density was calculated using the Jackson et al. (1978) equation: 1.109380 - 0.0008267 ('SF) + 0.0000016 ('SF)^2 - 0.0002574 (Age), where SF is the addition of tree skinfold thicknesses (chest, abdomen and thigh) taken with a caliper (pressure increments of 0.2 mm.). The fat percentage was calculated using the Siri (1956) equation: (495 / BD) - 450, where BD is the body density.

All tests were administrered to individuals with heroin abuse under the supervision of a qualified physical education instructor as well as a physician. Each test was performed by the same examiner.

Statistical analysis

Statistical procedures were performed using a statistical software package (SPSS v.11). Descriptive statistics (means and standard deviations) were calculated for all the variables. Data analysis included the Kolmogorov-Smirnov-Lilliefors test to determine the normality of distribution. Statistical significance was set at $p>0.05$. Data were compared with norm-referenced standards (healthy sample) because there are no referenced standard criteria for the Spanish population and so that it would be possible to compare our results with the original battery test. The anthropometric results were compared with the reference norms of Rodríguez et al. (1998b) for the Spanish-Catalan population (range 25-34 yr) and with Tojo and Leis's (1999) reference norms for the Spanish-Galician population (range 20-29 yr). Data analysis included calculating Pearson's product correlation coefficients to examine the relationships between the rehabilitation time and the drug consumption time.

Results

The demographic and therapeutic indicators of the participants are shown in Table 1. Descriptive statistics on the body composition values of individuals with heroin abuse are shown in Table 2. The normality of distribution was significant ($p>0.05$). The SA group had a lower weight, B.M.I. and fat percentage than the healthy population ($p<0.05$). Height, waist-hip ratio and body density did not show significant differences as compared to the nonuser population. No significant correlation was found between physical fitness, the rehabilitation time and heroin consumption time.

Table 2. Body composition measures for males with heroin abuse.

Variables	Heroin abusers ($M \pm SD$)	Healthy population ($M \pm SD$)
Weight (kg)	70.1 ± 8.4 *	73.87 ± 11.46
Height (cm)	172.6 ± 7.7	173.07 ± 6.08
Body Mass Index (kg/m^2)	23.51 ± 2.42 *	24.51 ± 3.25
Waist-Hip Ratio (cm)	0.87 ± 0.048	0.86 ± 0.06
Body Density (gr./ml)	1.07 ± 0.009	1.06 ± 0.008
Fat Percentage (%)	10.72 ± 4.20 *	14 ± 7

* significant differences ($p<0.05$) between reference norms for healthy population.

Discussion

The purpose of this study was to determine the body composition of individuals with heroin abuse and to compare these values with those of individuals without SA. For a better comprehension, the components of health-related body composition are analysed individually. The participants with SA are representative of the general population of Spanish drug users (European Monitoring Centre for Drugs and Drug Addiction, 2002).

Our study found that individuals with heroin abuse interned in therapeutic communities have a different body composition than their nonuser peers (Rodríguez et al., 1998b; Tojo and Leis, 1999) and that these values are as low as might be expected. These findings suggest that heroin abusers in TC have a significantly lower weight, B.M.I. and fat percentage than their nonuser peers.

Our participants with drug abuse weighed less than the nonuser population (almost 4 kg.). Considering that the normal range of B.M.I. is between 20-25 kg/m^2, these differ-

ences (1 kg/m^2) are not very important. Similar findings have been reported in other studies on drug abusers (Riera et al., 1998; Varela et al., 1997a; Varela et al., 1997b; Zador et al., 1996). With regard to the fat percentage, the participants had worse results (4%) than the nonuser population (Rodríguez et al., 1998b). Comparing the fat percentage data taken from individuals with SA in our study to those of other studies (Collingwood et al., 1991; Peterson and Johnstone, 1995; Riera et al, 1998) is difficult because the methods used to calculate the fat percentage differed. We suggest that the reason for this may be due to the poor nutritional intake associated with a drug-using lifestyle (sedentarism). Similar findings have been reported for other individuals with SA (Ambits-Esport, 1996; Mc Combie et al., 1995; Varela et al., 1997a; b; Zador et al., 1996).

We have not found any other study that has used the waist-hip ratio in participants with SA. Our findings suggest that participants with SA have a lower waist-hip ratio than their non-users peers, although not significant. The data on body density revealed no significant differences between substance abusers and individuals without SA, although the individuals with SA scored worse than nonusers.

Pearson's correlation confirmed that rehabilitation time and heroin consumption time have no influence on the body composition at 23 months of drug rehabilitation.

Conclusion

In spite of the methods used, anthropometric measurements seem to be appropriate for the evaluation of the body composition of drug abusers interned in therapeutic communities. The results of our research, together with results of previous studies, reveal that individuals with heroin addiction have a different body composition. Few significant differences were found between the participants with and without heroin abuse (weight, B.M.I. and fat percentage); nonetheless, heroin abusers usually had poorer results as compared with the healthy controls. This could be explained by the withdrawal from substance abuse (23 months) and the physically active life style. Comparison of the results is very difficult, because in previous studies the substance abusers were not sufficiently well classified as regards, into: age, rehabilitation phase, abstinence time, length of participation in the therapeutic program, etc.

The results reported here seem to be of interest for further developing our understanding of the healthy body composition of individuals with heroin abuse (body acceptance and physical self-esteem). In addition, they should also be use for determining which physical capacities (strength and endurance) should be improved in adapted physical activity programs, and which aspects of nutritional intake (protein, glucids and vitamins) should be taken into consideration. Future investigation should address the causes of these deficiencies, as well as procedures designed to improve them.

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