Fat-Free Mass and Handgrip Strength In NJCAA Athletes Based on Self-Reported Strength Training

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ABSTRACT

BACKGROUND: Strength training is an important component of health as it can impact body composition and continued functional ability. This is particularly important to athletes as they constantly participate in physically demanding activities. Self-reported survey data are important tools used to assess physical activity. Seven-day recall of physical activity has been shown to be a valid and reliable measure. The purpose of this study was to compare fat-free mass (kg) and dominant handgrip strength (kgf) between those who self-reported strength training (SRST) in the last seven days and those who did not (NST). METHODS: 15 traditional-aged (18-25y), full-time female NJCAA student-athletes (13 soccer players and 2 volleyball players) at a rural, commuter-based, predominantly two-year university, were recruited during the pre-season. Surveys inquiring about basic demographics and self-reported physical activity were collected. Height (cm), weight (kg), and body composition (fat-free mass, tetrapolar bioelectrical impedance analysis, RJL Systems Quantum X) were measured. Athletes indicated their dominant hand and handgrip strength was measured (Jamar handgrip dynamometer). Participants were divided into two groups based on whether they self-reported strength training in the last seven days (SRST, n=6 and NST, n=9). Independent sample t-tests were used to determine if significant differences between the groups existed. The significance level was set at $p<0.05$. RESULTS: There were no significant differences between groups in fat-free mass (SRST=41.58 ± 2.40kg v. NST=42.66 ± 3.25kg, p=0.266) or average dominant handgrip strength (SRST=31.16 ± 3.50kgf v. NST=33.43 ± 3.98kgf, p=0.139). DISCUSSION: Although increased fat-free mass and handgrip strength are related to strength training, there were no significant differences between the two groups. This study relied on self-reported frequency of strength training with no indication of the intensity or duration of the training. The handgrip strength values fall within the normative handgrip range (18-19y=32.5kgf, 20-24y=32.0kgf), indicating that the lack of difference may be a result of this apparently healthy population of physically active young adults. These data are preliminary from a larger multifaceted study. Additional participants may strengthen the results as the sample size increases.
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INTRODUCTION

Many components contribute to body composition and functional abilities, including strength training. Athletes especially need to keep track of their bodily health and strength as it is vital to their performance. Previous reports have found that self-reported survey data is a valid and reliable measure to assess physical activity.

The purpose of this study was to compare fat-free mass (kg) and dominant handgrip strength (kgf) between those who self-reported strength training (SRST) in the last seven days and those who did not (NST).

METHODS

Participants

Fifteen traditional-aged (18-25y) full-time, female college students at a predominantly 2-year, rural, commuter-based campus participated in this study. They were divided into groups based on whether they self-reported strength training or not.

Self-reported Strength Training (SRST), n= 6
Did not report Strength Training (NST), n = 9

Anthropometric Measures

Height was measured in centimeters using a stadiometer (Seca 213, Hamburg, Germany).

Weight was measured in kilograms using a digital scale (Befour PS7700, Saukville, WI).

BMI was calculated by dividing by weight in kilograms by height in meters^2.

Wrist circumference in centimeters was measured in triplicate, averaged, and used to calculate frame size.

Body Composition Measurements

Body composition was measured by tetrapolar bioelectric impedance analysis (BIA) using an RJL Systems Quantum X (Clinton Township, MI).

Handgrip Strength

Handgrip strength was measured on the participants' indicated dominant hand in kgf using a Jamar handgrip dynamometer (Performance Health, Warrenville, IL).

Data Analysis

Means and standard deviation for demographic variables, fat-free mass, and handgrip strength were calculated.

SPSS version 29 was used to run independent sample t-tests between groups for fat-free mass and handgrip strength.

The level of significance was set to $p < 0.05$.

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RESULTS

Table 1. Subject Demographics

	SRST (n = 6) Mean ± Std Dev	NST (n = 9) Mean ± Std Dev
Age (yr)	20.00±2.00	18.67±1.32
Height (cm)	159.69±4.74	164.68±4.37
Weight (kg)	56.45±6.92	61.10±8.41
BMI (kg/m^2)	22.11±2.42	22.47±2.51
Body Fat (%)	29.62±4.23	29.61±4.78

Table 2. Fat Free Mass and Handgrip Strength

	SRST (n = 6) Mean ± Std Dev	NST (n = 9) Mean ± Std Dev
Fat-Free Mass (kg)	41.58 ± 2.40*	42.66 ± 3.25
Handgrip Strength (kgf)	31.16 ± 3.50	33.43 ± 3.98

*n=5, for the fat-free mass in SRST group

There were no significant differences between groups in fat-free mass (p=0.266) or average dominant handgrip strength (p=0.139).

CONCLUSIONS

Although strength training has been shown to increase fat-free mass and handgrip strength, the two groups showed no significant differences. The lack of statistical significance may be attributed to inadequate information regarding the participants' strength training intensity and duration.

This study relied on self-reported frequency of strength training and did not collect information regarding nutrition or other health behaviors. Given that there was no indication of the intensity or duration of the training, the training was perhaps not enough to increase fat-free mass or strength.

The handgrip strength values (18-19y=32.5kgf, 20-24y=32.0kgf) fell within normative ranges and the group studied was composed of apparently healthy, physically active young adults. This may explain the lack of statistically significant differences between the two groups.

These data are preliminary measures from a larger multifaceted study. Additional participants may strengthen the results.

Future studies should consider including an additional section on the demographic survey inquiring about the intensity, duration, and type of strength training.

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