

EVALUATING THE IMPACT OF BODY COMPOSITION ON VERTICAL JUMP PERFORMANCE IN COLLEGIATE MALE HOCKEY PLAYERS

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ABSTRACT

The vertical jump (VJ) test is often used to determine hockey players' peak power capabilities. Prior studies have examined the effects that body fat percentage had on power output during vertical and broad jump tests with various athletic populations such as basketball, volleyball, and hockey players, etc. However, it appears that no study has evaluated the impact of body fat percentage (BF%), body fat mass (BFM), trunk lean mass (TLM), leg lean mass (LLM), skeletal muscle mass (SMM) and body mass index (BMI) on peak power during a VJ test. **PURPOSE:** To evaluate the relationship between BF%, BFM, TLM, LLM, SMM, and BMI on peak power during a VJ test using club level collegiate male hockey players. **METHODS:** After having descriptive data recorded, 31 male club level collegiate hockey players had their BF%, BFM, TLM, LLM, SMM, and BMI assessed via an InBody 770 Body Composition Analyzer. Subjects had their reach height measured, participated in a dynamic warm-up, were given a 4 min passive recovery (PR) period after the warmup, and then subjects completed one series of seven to 10 jumps with 30 secs of PR between each jump. Pearson Correlations were then performed between BF%, BFM, LLM, TLM, SMM, BMI, and VJ (ie. the highest jump) with significance differences determined at $p < 0.05$. **RESULTS:** A significant negative moderate correlation existed between BF% ($r = 0.561$, $p = 0.001$), BMI ($r = 0.583$, $p = 0.001$), and BFM ($r = 0.597$, $p = 0.001$) with peak power, while a non-significant negative low relationship occurred between SMM ($r = 0.223$, $p = 0.114$) and peak power. Also, no relationship occurred between TLM ($r = 0.038$, $p = 0.420$) and LLM ($r = 0.140$, $p = 0.226$) with peak power. **CONCLUSIONS:** BF%, BMI, and BFM appear to have a negative moderate relationship with VJ performance in collegiate club male hockey players, while TLM and LLM have no relationship with VJ Performance. Plus, SMM has a negative low relationship with VJ performance with this specific population. Future research may be required to determine if gender, fitness level, or a different type of body fat percentage measurement technique may play a factor when considering if BMI, BF%, LLM, TLM, and SMM have a relationship with VJ performance in athletes who utilize this specific test as an assessment tool for measuring peak power. **PRACTICAL APPLICATIONS:** Having a lower BF% may not necessarily predict higher jumping performance in collegiate male hockey players, yet the current study's results suggest that body composition does have an impact on jumping performance. Understanding body composition and its relationship to the performance of collegiate male hockey players certainly warrants further consideration and investigation.

INTRODUCTION

- The vertical jump (VJ) test is widely used as a method of measuring how high a person can jump and determining what the resulting power production will be. Prior studies have assessed the impact of BF% on VJ performance as Dawes et al. (2016) suggested an increase in estimated fat mass contributed to lower VJ performance in male police officers. Also, Abidin and Adam (2013) suggested that lower BF% was correlated with higher jumping performance in male and female collegiate aged martial arts students. This was supported by Bosak et al. (2019) using collegiate male volleyball players. Hence, a lower BF% appears to correlate with higher VJ performance. Conversely, lower BF% did not appear to correlate well with Wingate performance in collegiate male hockey players (Bosak et al., 2022). Yet, it appears that no prior research study has evaluated the relationship between BF%, BFM, TLM, LLM, SMM, and BMI on peak power and VJ performance in collegiate male hockey players.

PURPOSE

- To evaluate the relationship between BF%, BFM, TLM, LLM, SMM, and BMI on peak power during a VJ test using club level collegiate male hockey players.

METHODS

Subjects

- Thirty-one collegiate male club (DI, DII, & DIII) hockey players participated in this study.

Lab Protocol

- As per the ACSM criteria for being considered at least averagely fit, subjects must have previously participated in a resistance training program two days per week, cardiovascular training for 30 min per day at a moderate intensity for five days per week or 20 min per day at a vigorous intensity for three days per week, for a minimum of two months. All subjects met the above inclusion criteria.
- Subjects, who were well-rested, reported to the LU Human Performance Lab to complete a Physical Activity Readiness Questionnaire (PAR-Q) and an informed consent form and then had their BF%, height, weight, and reach height recorded. BF%, BFM, TLM, LLM, and SMM were assessed using the InBody 770 Bioelectrical Impedance Analysis System. Height and weight were measured using a Seca medical scale with a measurement rod attached. Subsequently, Body Mass Index (BMI) was calculated.
- Subjects then completed a 5 min dynamic warm-up. Upon completion of the warm-up, during a 4 min passive recovery period, subjects were given instructions about the proper execution of a countermovement jump (CMJ).
- Reach height and VJ height (in centimeters) were measured using a Vertec measurement device.
- After reach height was recorded, subjects were instructed to stare at the top vane of the Vertec within three seconds of starting their explosive CMJs. All CMJs occurred with maximum effort put forth by each subject. Subjects then completed up to 10 trials to reach their maximal jumping height.
- Subjects were given 30 seconds of passive recovery between each CMJ.

Statistical Analysis

- Mean and standard deviations were assessed for Age, Ht., Wt., and BF%.
- The highest jump was utilized for data analysis purposes. Pearson Correlations were performed between BF%, BFM, TLM, LLM, SMM, BMI and the highest recorded VJ with significant differences determined at $p \leq 0.05$.

RESULTS

- Descriptive statistics for the participants are displayed in Table 1.
- A significant negative moderate correlation existed between BF% ($r = 0.561$, $p = 0.001$), BMI ($r = 0.583$, $p = 0.001$), and BFM ($r = 0.597$, $p = 0.001$) with peak power, while a non-significant negative low relationship occurred between SMM ($r = 0.223$, $p = 0.114$) and peak power. Also, no relationship occurred between TLM ($r = 0.038$, $p = 0.420$) and LLM ($r = 0.140$, $p = 0.226$) with peak power.

DISCUSSION

- The purpose of this study was to assess the relationship between BF%, BFM, TLM, LLM, SMM, and BMI on VJ performance in collegiate club male hockey players.
- The results of this study, pertaining to BF% being correlated with VJ performance, tend to concur with prior studies (Abidin and Adam, 2013; Bosak et al., 2017; Bosak et al. 2019; and Dawes et al., 2016), despite the current study's participants being different than those utilized in previous studies. This opposes the Wingate and BF% results (Bosak et al., 2022). However, the LLM, TLM, and SMM results for this study align with the results from Bosak et al., 2017 which suggests that TLM, LLM, and SMM do not have a major impact on VJ performance in collegiate club male hockey players. Conversely, BMI and BFM may have a positive impact on VJ performance as was the case in the current study.

Descriptive Statistics

	Mean	Standard Deviation
Age (yrs)	21.9	1.5
Height (cm)	181.0	4.8
Weight (kg)	83.8	9.0
Body Fat%	13.5	5.7

Table 1

CONCLUSION

- The current results suggest that BF%, BMI, and BFM appear to have a negative moderate relationship with VJ performance in collegiate club male hockey players, while TLM and LLM have no relationship with VJ Performance. Plus, SMM has a negative low relationship with VJ performance with this specific population. Future research may be required to determine if gender, fitness level, or a different type of BF% measurement technique may play a factor when considering if BMI, BF%, LLM, TLM, BFM, and SMM have a relationship with VJ performance in athletes who utilize this specific test as an assessment tool for measuring peak power.

PRACTICAL APPLICATIONS

- The current study's results suggest that having a lower BF% may not necessarily predict higher jumping performance in collegiate male hockey players, yet the current study's results suggest that body composition does have an impact on jumping performance. Understanding body composition and its relationship to the performance of collegiate male hockey players certainly warrants further consideration and investigation.
- Prior studies did suggest a relatively strong relationship between lower body fat percentage values and higher VJ performance in no less than averagely fit individuals, but it cannot be assumed that just because an individual has a lower BF% that they will definitely jump higher during a VJ test. Also, the current study utilized BIA as the body fat percentage measurement tool, but several prior studies utilized skinfold calipers.