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Investigation of the Effect of Lifting Straps Use on Isometric Mid-Thigh Pull Strength Performance

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ORIGINAL ARTICLE

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Abstract

This study investigated the effect of lifting belt use on isometric mid-thigh pulling performance. Twenty healthy males with a mean age (mean ± standard deviation) of 20.8 ± 1.5 years, height and weight of 177.2 ± 1.6 cm and 73.8 ± 2.9 kg, respectively, participated in the study. Isometric mid-thigh pulling performance was measured using a back-leg dynamometer. The results of this study showed that the use of a lifting belt led to an increase in isometric mid-thigh pulling performance (p=0.001). According to the findings, the use of lifting straps was effective in increasing isometric mid-thigh pulling performance. In conclusion, the use of lifting straps significantly improves pulling performance in exercise patterns such as deadlifts and mid-thigh pulls by improving grip on the bar, compensating for low grip strength and alleviating fatigue in the grip muscles. Strength and conditioning coaches can play an important role in improving athletes' 1RM performance by incorporating lifting straps according to the athletes' training goals, especially in high weight pulling exercises.

Keywords: Isometric Mid-Thigh Pull, Lifting Straps, Maximal Pull Strength

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Kaldırma Kayışı Kullanımının Uyluk Ortası İzometrik Çekiş Kuvveti Üzerine Etkisi

Öz

Bu çalışmada, kaldırma kayışı kullanımının izometrik orta uyluk çekme performansı üzerindeki etkisi araştırılmıştır. Çalışmaya yaş ortalaması (ortalama ± standart sapma) 20,8 ± 1,5 yıl, boy ve kilo ortalamaları sırasıyla 177,2 ± 1,6 cm ve 73,8 ± 2,9 kg olan 20 sağlıklı erkek katılmıştır. İzometrik orta uyluk çekme performansı sırt-bacak dinamometresi kullanılarak ölçülmüştür. Bu çalışmanın sonuçları, kaldırma kayışı kullanımının izometrik orta uyluk çekme performansında artışa yol açtığını göstermektedir (p=0.001). Elde edilen bulgulara göre kaldırma kayışlarının kullanımı izometrik orta uyluk çekme performansını artırmada etkili olmuştur. Sonuç olarak, kaldırma kayışlarının kullanımı, deadlift ve orta uyluk çekme gibi egzersiz modellerinde, bar üzerindeki kavramayı iyileştirerek düşük kavrama gücünü telafi ederek ve kavrama kaslarındaki yorgunluğu hafifleterek çekme performansını önemli ölçüde artırır. Kuvvet ve kondisyon antrenörleri, sporcuların antrenman hedeflerine göre, özellikle yüksek ağırlık içeren çekme egzersizlerinde kaldırma kayışlarını dahil ederek sporcuların 1RM performansını geliştirmede önemli bir rol oynayabilir.

Anahtar Kelimeler: Uyluk Ortası İzometrik Çekiş, Kaldırma Kayışı, Maksimal Çekiş Kuvveti.

Introduction

The relationship between grip strength and lifting performance has been a focal point of interest in various fields, such as sports science and rehabilitation. Isometric Mid-Thigh Pull (IMTP) is of great significance in sports and exercise science because of its importance in evaluating overall body force production and its relationship with athletic performance (Thomas et al., 2015) Research has found that IMTP is associated with strength, sprinting, and agility performance in various athletic populations (Martin & Beckham 2020; Wang et al.,2016). Isometric Mid-Thigh Pull (IMTP) is a multi-joint exercise model used to assess total body strength and force production capabilities (Martin & Beckham 2020). The use of lifting straps during resistance training exercises has recently gained the attention of researchers. Lifting straps assist athletes in holding barbells, especially under heavy loads or high-volume conditions. Lifting straps are typically about 1-1.5 inches wide and 1-1.5 feet long, made from materials such as leather, canvas, or nylon (Cowan & DeBeliso 2017). Lifting straps can alleviate some of the weight from the fingers to the wrists, allowing for the lifting of greater loads in exercises where gripping is crucial (Valério etl al., 2021). The purpose of the lifting straps is to allow the lifter to focus on the actual pulling or lifting phase without worrying about the grip (Cowan & DeBeliso 2017). Previous studies have investigated the effects of lifting straps on exercise performance, grip strength, and other relevant variables. Researchers have found that the use of lifting straps directly affects exercise performance, which requires manual grip strength and increases the amount of work performed by the target muscles (Coswig et al., 2015). Additionally, early fatigue of forearm flexor muscles in moderate-to high-load protocols may negatively impact the total volume of the workout (load × repetitions), leading to suboptimal gains in strength and muscle hypertrophy (Krieger 2009; Krieger 2010; Schoenfeld et al., 2017; Schoenfeld et al.,2014). Therefore, owing to the potential negative effects of low grip strength and early forearm fatigue, the use of training equipment such as lifting straps in exercises such as pull-down may be appropriate (Valério etl al., 2021). In a study conducted on deadlift exercises using lifting straps, higher values were observed in the 1RM test than without lifting straps (Coswig et al., 2015). Lifting straps not only allows for lifting heavier weights, but also reduces fatigue in the forearm flexor muscles. Hence, lifting straps may enable individuals to lift heavier weights, increase the number of repetitions, and enhance the activation of the target muscle, as the set does not end because of fatigue in the assisting muscles (Gacesa et al., 2013; Golas et al., 2017).

The aim of this study was to investigate the impact of using fitness-lifting straps in pull-focused movements such as deadlifts, high pulls, and lat pull downs on isometric pulling strength using a dynamometer device.

Materials and Methods

This study employed a single-group pre-test post-test model. The participants were assessed in groups of five on four different days at the same time. Prior to the pre-tests, participants underwent low-intensity estimated 1RM warm-up exercises in the strength training facility, constituting 10 min of warm-up. The warm-up exercises included two sets of eight repetitions for squats, two sets of eight repetitions for bench press, two sets of eight repetitions for lat pull-down, and two sets of eight repetitions for back pull-down movements. Estimated 2-3 minutes of rest interval was provided between exercises. Following the completion of the warm-up, measurements were initiated. Four repetitions of the maximum isometric pull were conducted. To ensure adaptation to the test and to eliminate learning-based effects, a sequence of six maximum mid-thigh isometric pulls was performed, alternating between one repetition without straps and one repetition with straps. Participants were given approximately 3-5 minutes of rest after each repetition.

Participants

The study involved the voluntary participation of 20 male individuals aged between 18 and 24 years who regularly engaged in strength training and had no known health problems. Before participating in the study, participants were provided with detailed information about the design of the research and were asked to fill out a voluntary informed consent form.

Testing Protocol

Height-Weight Measurement

Participants' heights will be measured using a stadiometer scaled to 0.1 cm (Geeat, et all 2009). Measurements will be conducted barefoot, and individuals will be asked to lean their backs against the wall and keep their feet together. The stadiometer was adjusted to touch the participant's head, and the result was recorded as the height.

Body Composition

BC-418 (Tanita Corp.) was used for the electrical impedance analysis measurements. The system consists of four stainless-steel rectangular foot electrodes placed on force transducers fixed to a metal platform for weight measurement and two holding places with front and back electrodes, providing a total of eight electrodes. Measurements will be conducted with a 0.8 mA sinusoidal wave constant current at 50 kHz. Participants' age, gender, and height will be entered, and the body type for all participants will be set as 'standard' (Meredith-Jones et al., 2014).

The participants will be instructed to remove any metal accessories before testing. A weight damper (0.5 kg) was applied to all participants. Subsequently, the participants were asked to stand barefoot on the metal footplates of the machine while holding the handles in a steady position. The test surface was wiped and dried prior to each measurement.

Isometric Mid-Thigh Pull

A calibrated back-leg strength dynamometer was used to measure Isometric Mid-Thigh Pull performance (Shiba et al., 2023). Back-leg strength dynamometer has been reported in studies as a suitable method to evaluate back-leg muscle strength in healthy adolescents and adults (Hoor et al., 2016). To adjust the initial posture of the participants, the knee and hip joint angles were measured with a goniometer set approximately between 145-135° with the chain extended. Participants were instructed to pull the chain without straps as quickly as possible, with maximum effort for 4-5 seconds. Subsequently, the results were recorded in kg-f units. Approximately 4-5 minutes of rest intervals were provided between the repetitions. Following this, participants were asked to perform the same measurement as the barbell, this time using lifting straps, maintaining the same movement form, and the result was reported in kg-f units. The highest scores were used for the statistical analysis.

Figure 1. Measurement of Knee Angle and Without Straps Isometric Mid-Thigh Pull

Figure 2. Measurement of Knee Angle and With Straps Isometric Mid-Thigh Pull

Statistical Analyses

The data obtained from the study were analyzed using IBM SPSS 26 for Windows software. To examine the normal distribution of the data, Kolmogorov-Smirnov analysis, Skewness, Kurtosis coefficients, and P-P, Q-Q plots were employed. Because the data exhibited a parametric distribution, the Paired Sample T-Test method was applied without strap and strap comparisons.

Results

Table 1

Descriptive Statistics

Parameters	**x̄ ± s.d** (n=20)	**t**	**p**
Without Straps Isometric Mid-Thigh Pull(kg-f)	181.4 ±28.9		
		-7.542	*<0.001
With Straps Isometric Mid-Thigh Pull(kg-f)	224.4 ±39.3		

The average age of the 20 participants included in the study was found to be 20.8±1.5, with an average height of 177.2±1.6 and an average weight of 73.8±2.9.

Table 2

Comparisons for Isometric Mid-Thigh Pull Without Straps and With Straps

	Minimum (n=20)	**Maximum** (n=20)	**x̄± s.d**
Age	18	24	20.8±1.5
Height	168	192	177.2±1.6
Weight	55	107	73.8±2.9

*Statistical significance ($p<0.05$) compared to that without straps

When examining the isometric mid-thigh pull performance values obtained from participants with and without the use of straps in Table 2, a statistically significant difference was observed in the performance of the isometric mid-thigh pull when using straps ($p<0.05$).

Figure 3. Maximum Isometric Mid-Thigh Pull Performance of Participants Without Straps-With Straps

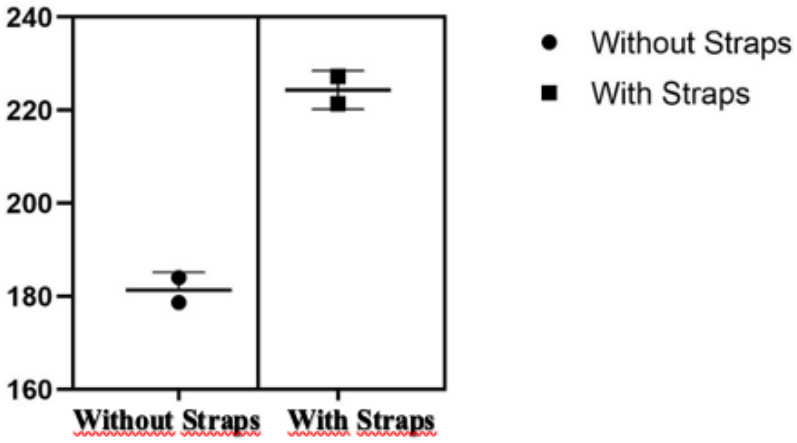
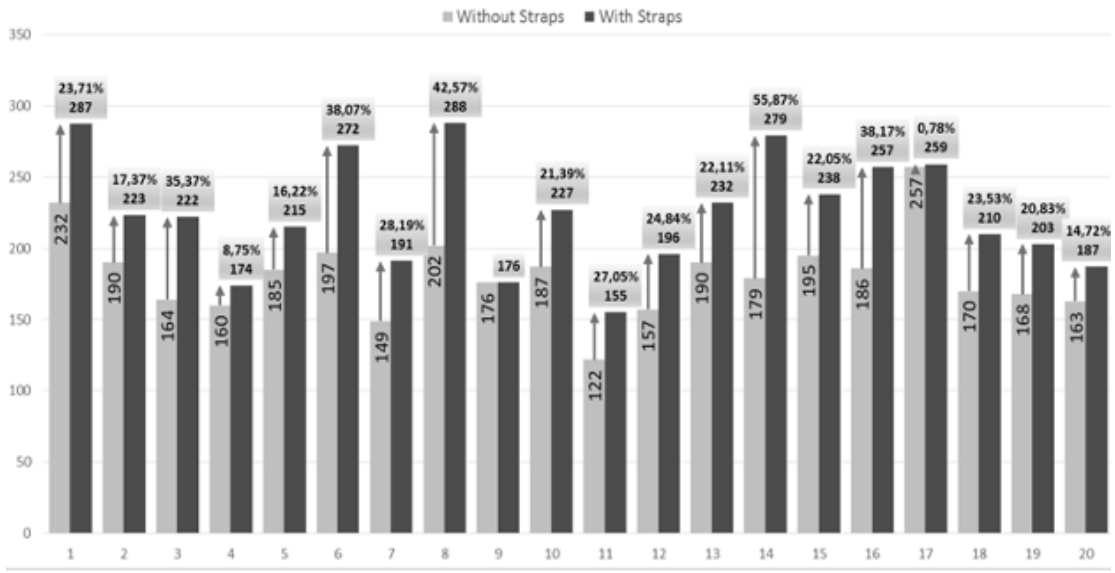


Figure 4. Participants' Average Isometric Mid-Thigh Pull Performances Without Straps and With Straps



Discussion

Biomechanical and physiological considerations are crucial when investigating the impact of lifting straps on the pulling performance. Lifting straps are commonly used to enhance grip strength and support wrists during heavy-pulling exercises. Despite the widespread use of lifting straps, research on their performance is limited. Previous studies have focused on the impact of lifting strap usage on deadlift-lifting performance, load-velocity relationships, and repetitions. The primary aim of this study was to examine the effect of lifting straps on isometric mid-thigh pull performance using a back-leg force dynamometer.

The main findings of this study are as follows: The use of lifting straps increased the maximum pulling force during isometric mid-thigh pull performance by an average of 43.0 kg-f, representing a 23.7% improvement. Research indicates that the dependence on grip strength is reduced with lifting strap usage, significantly increasing the lifted weight during the pulling performance. In one study, the use of lifting straps allowed individuals to lift larger loads and the same load at higher speeds (Jukic et al., 2021). In a different study, the use of lifting straps was found to enhance the power-clean 1RM performance (Cowan, J., & DeBeliso, M. (2017). Another study investigating the effects of lifting strap usage during lat pulldown exercises on 1RM value, repetitions, and muscle activation found that lifting strap usage did not affect 1RM, repetitions at 70% of 1RM (per set and total), or muscle activation (Valério et al., 2021). The beneficial effects of lifting straps during deadlifts, resulting in an approximately 16% increase in 1RM values, have been demonstrated (Coswig et al., 2015). This contradiction has been suggested to be related to the load used during exercise (Valério et al., 2021).

In a recent study on this topic, using lifting straps during deadlifts allowed women to perform more repetitions with greater preserved grip strength without negatively affecting the barbell speed. The study emphasized that lifting straps appeared to be beneficial for women in deadlift performance and should be considered during resistance training, which includes deadlift exercises (Trahey et al., 2023). The use of lifting straps during deadlifts has been shown to better preserve grip strength, facilitate faster grip strength recovery after training, and provide greater perceived grip safety and strength compared to deadlifts without lifting straps, while also enhancing mechanical performance and reducing perceived grip strength. Therefore, the ergogenic potential of lifting straps has significant implications for training, especially during resistance training involving deadlift exercises and other pulling exercises, and should be taken into consideration (Jukic et al., 2021).

Practical Applications

In conclusion, the use of lifting straps significantly enhances pulling performance in exercise models, such as deadlifts and mid-thigh pulls, primarily by improving the grip on the bar, compensating for low grip strength, and alleviating fatigue in the gripping muscles. Strength and conditioning coaches may play a significant role in improving athletes' 1RM performance by incorporating the use of lifting straps, especially in pulling exercises involving high weights, according to athletes' training goals. It is recommended for researchers to expand the discussion by evaluating ground reaction forces and grip forces together by using high-standard force platforms in future studies on the subject.

Ethics Committee Permission Information

Ethics Review Board: Erciyes University Clinical Search Ethics Board

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Statement of Researchers' Contribution Rates

All authors contributed equally at all stages of the research.

Conflict of Interest

The authors cannot make a statement of conflict regarding the research.

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