Tsunami Bar™ Scientific & Research Information

'Why' and 'How' does the Tsunami Bar™ work

(May 2013)

"An athlete that is trained in the correct use of the flexible Tsunami Barbell™ is able to maximize the impulse forces for only a short period of time at critical points in a lift by properly timing their concentric contractions against the acceleration of the oscillating flexible barbell. This stimulates strength development by recruiting maximal motor units similar to lifting a 1RM and enhances speed of muscle contraction once the bar changes direction, thereby allowing the athlete to minimize their Explosive Strength Deficit (ESD) and achieve optimum Power (Explosive Strength = The Ability to Exert Force Quickly). These results are achievable with the Tsunami Barbell™ using submaximal weights, moving weights at maximal speeds, stimulating stabilizer muscles and accelerating through the end of the lift. The coach can determine which joint angle corresponds to specific athletic movements and instruct the athlete in when to apply the opposing force to the downward flex of the bar." by Tony Caterisano, PhD, FACSM, CSCS*D

Please review the next 3 pages which are the Abstracts of the 3 scientific and research papers on the Tsunami Bar™ to be presented at the American College of Sports Medicine National meeting in Indianapolis, IN on May 31, 2013

AMERICAN COLLEGE of SPORTS MEDICINE
LEADING THE WAY

60th Annual Meeting and 4th World Congress on Exercise is Medicine®

May 28-June 1, 2013; Indianapolis, IN USA
http://acsmannualmeeting.org/

Presentation Abstract	**2013** ACSM 'Annual Meeting'

Session:	F-31-Resistance Training; Friday, May 31, 2013, 1:00 PM - 6:00 PM
Presentation:	2506 - **Comparison of Applied Forces between Flexible Tsunami Barbell and Olympic Barbell during Bench Press**
Location:	Hall C, Poster Board: 207
Pres. Time:	Friday, May 31, 2013, 3:30 PM - 5:00 PM
Category:	102. Fitness Assessment, Exercise Training, and Performance of Athletes and Healthy People - Exercise Training Interventions in Healthy People
Keywords:	Tsunami Barbell; Force; Flexural Stiffness
Author(s):	Randolph E. Hutchison, Anthony V. Caterisano, FACSM, Raymond F. Moss, Jason T. Jakiela, Victoria Haggett. *Furman University, Greenville, SC.*
Abstract:	Various apparatus have been used instead of the traditional Olympic barbell for the development of power in athletes. One such apparatus is the flexible Tsunami Barbell™ (TB), which is similar in overall length to a standard Olympic barbell (OB). Although the TB has shown potential advantages as far as increased muscle recruitment compared to an Olympic barbell, the material and geometric properties of the bar have not been characterized in terms of the applied force requirement to move the bar in a practical training mode. **PURPOSE**: The purpose of the study was to determine whether there is a difference in the required applied force between the TB and an OB when moved in a machine simulated bench press motion. Preliminary results with human subjects (HS) performing a close grip bench press were also compared to the machine data. **METHODS**: A machine was built that can simulate the motion of a bench press cycling a barbell at a constant 52 Hz in various configurations. Configurations tested of the TB included modifications of the material and internal geometry (flexural stiffness between 147,000 lb-in^2 and 300,400 lb-in^2). Two different weights were tested on the TB and OB, 195 lbs (HW) and 105 lbs (LW). Data was collected using an AMTI force plate for 60 seconds. Data was analyzed for the middle 40 seconds to exclude the dynamic effects of starting and stopping the machine. The maximum peak forces (MXF) and minimum peak forces (MNF) were compared between the TB and OB using a one-way ANOVA. Human subjects performing a similar bench press using the standard configuration of the TB were compared with a paired t-test. **RESULTS**: For the machine trials, all configurations for the TB were significantly different from the OB in terms of maximum peak forces (MXF) and minimum peak forces (MNF) except for four configurations ($P<0.05$). The difference in MXF between the TB and OB ranged from +226 N to +1954 N for the HW configuration and +58 N to +381 N for the LW configuration. The difference in MNF between the TB and OB ranged from -44 N to -1590 N for the HW configuration and -48 N to -393 N for the LW configuration. For the HS, significant differences were also seen in MXF (+78N) and MNF (-34N). **CONCLUSIONS**: With similar weights and hand motion, the TB is capable of producing larger external reaction forces compared to an OB.
Disclosures:	**R.E. Hutchison:** None.

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Presentation Abstract	**2013** ACSM 'Annual Meeting

Session:	F-31-Resistance Training; Friday, May 31, 2013, 1:00 PM - 6:00 PM
Presentation:	2498 - **Comparison Of Muscle Activity Between The Tsunami Barbell™ And An Olympic Barbell**
Location:	Hall C, Poster Board: 199
Pres. Time:	Friday, May 31, 2013, 3:30 PM - 5:00 PM
Category:	102. Fitness Assessment, Exercise Training, and Performance of Athletes and Healthy People - Exercise Training Interventions in Healthy People
Keywords:	Tsunami Barbell; muscle activation; bench press
Author(s):	Jason T. Jakiela, Anthony Caterisano, FACSM, Randolph E. Hutchison, Taylor Snook, Graham Rogers, Raymond F. Moss. *Furman University, Greenville, SC.*
Abstract:	Variations on a standard Olympic barbell (chains, resistance bands, board presses) have been used as alternative methods for power development. A new product, the Tsunami Barbell™ (TSB), claims to insight increased muscle activity due to its flexible nature when compared to performing similar lifts on an Olympic barbell (OB). **PURPOSE**:The study sought to determine whether there is a difference in muscle activity when performing a bench press with a flexible barbell (Tsunami Barbell™) versus with a standard Olympic barbell. **METHODS**: Male varsity athletes (n=13, age=19.5±1.4) from Furman University who had been previously trained with the TSB volunteered to participate. After a familiarization trial, surface electrodes were placed on five major muscles: anterior deltoid (AD), lateral deltoid (LD), posterior deltoid (PD), pectoralis major (PM), and triceps brachii (TB), to monitor muscle activity via EMG. Using an estimate of their 1RM for bench press, subjects were asked to perform three sets; the estimated 1RM with the OB to find maximal voluntary contraction (MVC), 40% of 1RM with the TB, and 40% of 1RM with the OB. For the 40% lifts, subjects performed 7-10 repetitions in sync with a metronome set at 50Hz. The TSB and OB sets were normalized to the 1RM voltage. Two measures were analyzed: the normalized max (NM) and the mean of the integrated signals (MI) for 4 reps in the middle of each set. **RESULTS**: The TSB showed significantly higher muscle activity for all five muscles groups in both analyzed measures (Table 1). **CONCLUSIONS**: The results of this study suggest that muscle activity in the muscle groups studied may be greater when performing a bench press with the Tsunami Barbell™ than with an Olympic barbell at the same weight.

Table 1: %MVC

Bar Type	Anterior Deltoid	Lateral Deltoid	Posterior Deltoid	Pectoralis Major	Triceps Brachii
Tsunami	NM: 83.5±11.7* MI: 5.7±1.3*	NM: 64.5±21.2* MI: 3.4±0.9*	NM: 55.6±24.4* MI: 3.3±1.3*	NM: 80.8±20.0* MI: 5.7±2.1*	NM: 68.8±19.8* MI: 3.7±1.8*
Olympic	NM: 66.5±13.5 MI: 5.0±1.2	NM: 46.7±18.3 MI: 2.8±1.0	NM: 39.7±21.2 MI: 2.5±1.2	NM: 62.1±16.4 MI: 4.4±2.0	NM: 50.5±18.3 MI: 2.7±1.2

*P<0.05, P<4E-4

Disclosures:	**J.T. Jakiela:** None.

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Presentation Abstract **2013** ACSM 'Annual Meeting'

Session: F-31-Resistance Training; Friday, May 31, 2013, 1:00 PM - 6:00 PM

Presentation: 2495 - **Improved Functional Power Over A 5-week Period: Comparison Of Traditional Training To Tsunami Barbell™ Training**

Location: Hall C, Poster Board: 196

Pres. Time: Friday, May 31, 2013, 3:30 PM - 5:00 PM

Category: 102. Fitness Assessment, Exercise Training, and Performance of Athletes and Healthy People - Exercise Training Interventions in Healthy People

Keywords: Tsunami Barbell; Power; 5-Week

Author(s): Anthony Caterisano, FACSM, Randolph Hutchison, David Abernethy, Jason T. Jakiela. *Furman University, Greenville, SC.*

Abstract: Recent studies compared resistance-training modes for power development over a short training period of 4-7 weeks. Their findings suggest that neuromuscular adaptations enhance the rate of force development in short training periods. **Purpose:** The study was to compare two different power-training systems over a 5-week period: a traditional Functional Power Training program (FPT) using speed lifts with an Olympic barbell vs. an experimental Tsunami Barbell™ program (TB) using a flexible barbell. Methods: Varsity football players (n = 28) were randomly assigned to two training groups. The FPT group followed a functional power program using 45 - 60 % of 1RM and the TB group used a flexible barbell (Tsunami Barbell™) with a fixed weight of 125 lb. for all lifts. The programs were matched so both groups performed the same lifts 4 d/wk in a split routine. FPT progressed from 45% of 1RM in each lift to 60% during the 5-weeks. TB used the same resistance throughout the 5-weeks but progressed by increasing the speed of the lifts. Following familiarization trials, subjects were tested before and after the training period by vertical jump (VJ), long jump (LJ), seated medicine ball throw (MB) and a Margaria stair power test (MPT). **Results:** The results are presented in the table 1.Both groups experienced increases in VJ and MB that was not significantly different between training modes. LJ only improved significantly in the TB group and not in the FPT group. MPT improved in both groups but the TB group improved at a significantly higher level than the FPT group (P = 0.02). **Conclusions:** Results suggest that TB and FPT training improved power over a 5-week training period, but that TB training may be more effective than FPT in lower body power development.

Table 1

Test	Pretest FPT	Post-test FPT	Pretest TB	Post-test TB
Vertical Jump (VJ)	22.8 ± 3.5 in.	25.4 ± 3.1 in.*	26.8 ± 2.7 in.	29.5 ± 2.6 in.*
Medicine Ball (MB)	202.07 ± 27.3 in.	234.21 ± 30.8 in.*	200.78 ± 16.3 in.	241.71 ± 20.7 in.*
Margaria Power (MPT)	248.3 ± 14.2 kg-m/sec.	271.2 ± 13.2 kg-m/sec.*	250.9 ± 10.6 kg-m/sec.	298.3 ± 11.0 kg-m/sec.*#
Long Jump (LJ)	92.1 ± 9.3 in.	91.6 ± 9.0 in.	97.8 ± 9.1 in.	100.1 ± 9.7 in.*

*P< 0.05 #P = 0.02

Disclosures: **A. Caterisano:** None.