Short Communication

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2022.44.006997

Determining Grip Width for Proposed Shoulder Saver Bench Bar

David D Peterson*, Kaitlyn M Tyms and Mark Caleb Smith

Cedarville University, United States

***Corresponding author:** David D Peterson, Assistant Professor of Kinesiology, Cedarville University, Cedarville, OH, United States

ARTICLE INFO

Received: May 17, 2022

Published: May 24, 2022

Citation: David D Peterson, Kaitlyn M Tyms, Mark Caleb Smith. Determining Grip Width for Proposed Shoulder Saver Bench Bar. Biomed J Sci & Tech Res 44(1)-2022. BJSTR. MS.ID.006997.

ABSTRACT

The bench press is a popular exercise used in strength training regimes. However, individuals with shoulder injuries are often precluded from performing the bench press or require some type of modification. Current modifications include using dumbbells or a multi-grip bar instead of the traditional straight bar. Another possible modification could be the proposed Shoulder Saver Bench Bar. The purpose of this study was to determine what the distance between the hand grips should be for the proposed bar as well as whether a "one size fits all" option would be possible. The results of the study suggest that 22 in. (56 cm) between the hand grips could suffice for a "one size fits all" option. However, offering the proposed bar in two sizes (i.e., 21 in. (53.96 cm) and 23 in. (58.77 cm)) is likely the preferred option to better accommodate users of various weights (≤ and > 165 lbs.).

Introduction

The bench press is a popular upper body exercise commonly used to develop both size and strength in the chest, shoulders, and triceps musculature. Most injuries pertaining to the bench press occur either abruptly from high force movements or gradually from repeated low force movements (Asaa, et al. [1,2]). Additionally, most bench press related injuries occur at the shoulder (Golshani, et al. [3-5]). (Escalante [6]) suggests that shoulder is most prone to injury when abducted and externally rotated, both of which occur when performing the bench press. Individuals with shoulder injuries are often precluded from performing the bench press or require some type of exercise modification. For example, (Green, et al. [7]) recommend individuals with shoulder injuries perform the bench press with a narrower grip and stop the descent of the bar 4-6 centimeters (cm) above the chest. Other recommendations for individuals with shoulder injuries include performing the bench press with dumbbells or using a multi-grip bar instead of the traditional straight bar.

Another possible option for individuals with shoulder injuries could be the Shoulder Saver Bench Bar (Figure 1), a hypothetical new barbell that allows users to employ similar a hand placement to that of the dumbbell bench press without the bulkiness of a traditional multi-grip bar (Figure 2). The purpose of this study was threefold. First, to determine the average (i.e., mean) biacromial width and distance between the third and fourth phalanges of both hands taken at the metacarpophalangeal joint when in a push-up position (hereafter referred to as hand measurement) for the test subjects participating in the study. Second, to determine whether a "one size fits all" option would be possible for the proposed Shoulder Saver Bench Bar, and if so, what the distance between the hand grips should be to accommodate most users. Third, if a "one size fits all" option is not possible, to determine how many size options there should be for the proposed Shoulder Saver Bench Bar to accommodate most users as well as what the distance between the hand grips should be for each size option.

Figure 1: Proposed Shoulder Saver Bench Bar.

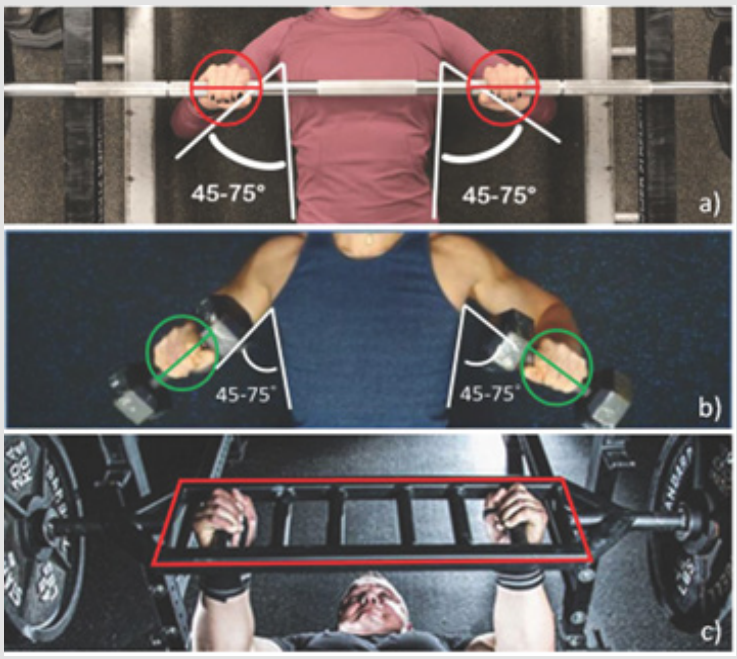

Figure 2:
a) Hand placement for traditional straight bar.
b) Hand placement for dumbbell bench press.
c) Hand placement for multi-grip bar.

Methods

Test subjects from the study included faculty, staff, and students from Cedarville University who were 18 years or older and able to perform at least one push-up. The following demographic information was taken from each test subject: height, weight, biacromial width, and hand measurement. Although the researchers are unaware of any previous studies that used hand measurement as an official means of measurement, several studies have used biacromial width when assessing upper body strength and push-up performance (Cogley, et al. [8-10]). Data on all test subjects was collected via two stations. At the first station, height and weight measurements were taken. Both measurements were taken using health-o-meter professional scale (Model No. 500KL). At the second station, biacromial width and hand measurement were taken. Both measurements were taken using a Sammons Preston Rolyan tape measure. Data was recorded in Excel spreadsheet and converted to SPSS. Analysis included measures of central tendency, correlations between interval level variables, and an investigation of mean differences between meaningful categories. Multivariate analysis was conducted but revealed nothing significant beyond the bivariate results reported below.

Results

The variables analyzed were gender, height (in inches (in.)), weight (in pounds (lbs.)), biacromial width (in cm), and hand measurement (in cm). Hand measurement was the dependent variable. A total of 52 test subjects participated in the study, 31 were male and 21 were female. Descriptive statistics of the interval

level variables, to include the mean, range, and standard deviation of the various variables, are provided in (Table 1). As depicted by the reported range and standard deviation in (Table 1), there was a significant amount of variability for hand measurement. Specifically, while the mean for the hand measurement was just over 56 cm, cases varied from 39 cm to 74 cm. Given that hand measurement was the variable of interest, the remainder of the statistical analysis was used to determine how the remaining variables related to hand measurement. (Table 2) reports correlations among the interval level variables. Unsurprisingly, there were significant relationships between height, weight, and biacromial width. However, only weight was correlated with hand measurement. Although the relationship between weight and hand measurement was statistically significant and positive, it was moderate in nature (i.e., r = .343). Additional analyses were performed to determine if differences in hand measurements could be found based on nominal categories such as gender and weight. Results of these analyses are provided in (Table 3). In terms of gender, the results indicate there were no significant differences in mean hand measurement for males (56.90 cm) and females (55.57 cm). In terms of weight, the results indicate there was a significant difference for weight when reconstructed categorically. Specifically, the mean level of weight was effectively 165 lbs., so a variable that considered cases at or under 165 lbs. (n = 26) in comparison to those over 165 lbs. (n = 26) was constructed. The results showed a significant difference for those test subjects weighing at or under 165 lbs. (53.96 cm) as compared to those weighing over 165 lbs. (58.77 cm).

Table 1: Descriptive Statistics.

	Mean	Range	Std. Dev.
Hand Measurement	56.37	35	8.67
Biacromial Width	43.54	17	3.39
Height	68.46	19	4.21
Weight	165.62	165	34.55

Note: N = 52

Table 2: Correlation Matrix.

	HM	BW	Height	Weight
HM	--	.215	.182	.343*
BW	.215	--	.362	.718**
Height	.182	.362**	--	.533**
Weight	.343*	.718**	.533**	--

Note: *Correlation is significant at the .05 level (2-tailed)

**Correlation is significant at the .01 level (2-tailed)

N = 52

Table 3: Mean Differences in Hand Measurement by Gender and Weight.

Variable	Categories	Mean HM	Std. Error (Mean)	T-test
Gender	Male	55.57	2.128	.540
	Female	56.90	1.432	
Weight	<=165	53.96	1.793	2.063*
	>165	58.77	1.489	

Note: *Significant at the .05 level (two-tailed)

N = 52

Limitations

The primary limitation of the study was the small sampling size (n = 52). It is possible that additional cases, with a stronger sampling of females, additional body types (as defined by height and weight in isolation and in combination), or age ranges could yield different results.

Discussion

The results of the study suggest that hand measurement is not statistically related to gender, height, or biacromial width, but is moderately correlated to weight when measured continuously or nominally. The results of the study also suggest that a "one size fits all" option for the proposed Shoulder Saver Bench Bar may be

possible and that the proposed distance between the hand grips should be 22 in. (56 cm). If the proposed Shoulder Saver Bench Bar were to be offered in multiple size options, the results suggest that having two size options would accommodate most users. Specifically, 21 in. (53.96 cm) between the hand grips for smaller users (i.e., at or under 165 lbs.) and 23 in. (58.77 cm) between the hand grips for larger users (over 165 lbs.).

References

1. Aasa U, Svartholm I, Andersson F, Berglund L (2017) Injuries Among Weightlifters and Powerlifters: A Systematic Review. British Journal of Sports Medicine 51(4): 211-219.
2. Keogh JWL, Paul WW (2017) The Epidemiology of Injuries Across the Weight-Training Sports. Sports Med 47(3): 479-501.
3. Golshani K, Mark EC, Peter O, Kenneth S, Laura K, et al. (2018) Upper Extremity Weightlifting Injuries: Diagnosis and Management. J Orthop 15(1): 24-27.
4. Kolber MJ, Kristina SB, Ming-Shun SC, Madeleine AH (2010) Shoulder Injuries Attributed to Resistance Training: A Brief Review. JSCR/NSCA 24(6): 1696-1704.
5. Sharma R, Singh Vij J (2005) Occurrence of Bioccipital Tendonitis/ Rotator Cuff Tendonitis in the Subjects involved in Bench- Press Activities in Gymnasium. Journal of Exercise Science and Physiotherapy 1(2): 85-88.
6. Escalante G (2016) Exercise Modification Strategies to Prevent and Train Around Shoulder Pain. Strength and Conditioning Journal 39(3): 1-13.
7. Green CM, Comfort P (2007) The Effect of Grip Width on Bench Press Performance and Risk of Injury. Strength and Conditioning Journal 29(5): 10-14.
8. Cogley RM, Teasha AA, Jon FF, Mandy MK, James WY, et al. (2005) Comparison of Muscle Activation Using Various Hand Positions During the Push-Up Exercise. Journal of Strength and Conditioning Research 19(3): 628-633.
9. Coyne JOC, Tran TT, Secomb JL, Lundgren L, Farley ORL, et al. (2016) Association Between Anthropometry, Upper Extremity Strength, and Sprint and Endurance Paddling Performance in Competitive and Recreational Surfers. International Journal of Sports Science & Coaching 11(5): 728-735.
10. Nichols IA, Szivak TK (2021) Effects of Different Hand Widths on Plyometric Push-up Performance. Journal of Strength and Conditioning Research 35(1): S80-S83.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2022.44.006997

David D Peterson. Biomed J Sci & Tech Res