



WEIGHTLIFTING PERFORMANCE – DOES THE GRIP STRENGTH REALLY MATTER?

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Abstract

Key words: Clean & Jerk, Corelation, Grip strength, Snatch, Weightlifting

INTRODUCTION

Olympic bar in athlete's hands and ground under weightlifter's feet. Because muscles are working in chains and we are only so strong as our weakest part, there should be a need of strong grip. As we have gone through the studies, we found that grip strength does not play so important role in final weightlifting performance, but there are other variables which are essential. In general authors are talking about grip width and when it comes down to the grip strength, we will more likely come to the hook grip importance (Everett, 2012). Significant difference in grip strength we can only see between elite and nonelite weightlifters (14.43%) (Fry et. al. 2018). Kipp and Harris (2017) found that lifting greater external loads during the clean is due the ability to generate large extensor joint impulses. These findings are confirmed also by Durovic, Zrnzevic, Okicic, Jorgic and Milanov (2016). On the other side, according to Siahkoughian, Azimi and Hedayatnejad (2016), there are strong correlations between lean body mass (LBM) and the performance of the weightlifters ($p \leq 0.001$). This fact is also confirming Siff (2003), who said that „The heavier the athlete, the larger the load he can lift”. Next strong correlations found Cartlock (2016), which says that peak power derived from the vertical jump is a great tool in assessing weight lifting performance. Young, Coggins, McInnis and Bailey (2017) than also came with the statement „who can lift more weight, can jump higher”. This statement consequently confirms positive correlation between vertical jump and weight lifting performance.

High vertical jump, power in snatch, or clean are variables, which have big transfer also to the other sports. This fact also confirms study of Pavlík (2014) and Brúnn (2017), who used weightlifting elements during running performance development and ice hockey off-ice preparation.

Increasing demands on sportsmen, setting new records up, maximal stable performance for a long period of time, are variables of today's sport reality, so we have to deal with every single detail of particular sport discipline performance (Sýkora, 2016).

AIM

The aim of study was to verify relation between grip strength with snatch and clean & jerk performance in order to clear importance of grip strength in elite weightlifters.

METHODS

Our sample consisted of 8 elite Slovak national team weightlifters (Age 23.75 ± 4.62 years, Weight 89.61 ± 13.80 kg). The measurements took a part during october 2017 in Dukla Banská Bystrica diagnostic laboratory, when weightlifters participated on grip strength testing and maximal performance testing in weightlifting snatch and clean & jerk movements. For grip strength measurements hand dynamometer HD-BTA was used. HD BTA dynamometer is device which can measure grip strength, finger strength and hand muscles exhaustion as well. Device is converting strength to electric voltage and tracking its size via interface data collecting and showing results in a software either in N (Newtons), Lbs (Pounds) or Kg (kilograms). It can measure any voltage between 0-850 N, it has high level of accuracy (± 0.06 N) and can be plugged in a standard electrical outlet. Weightlifters performed 2 tries of maximal squeezing with dominant and non-dominant hand, when sensor is placed vertically with shoulder of holding arm placed upright to trunk and straightened arm. In a maximal snatch and clean & jerk tests, subjects used standard weightlifting warm up and worked to maximal weight, where they performed 3 sets of 1 repetition maximum with 5 minutes rests between sets. There was a 1 hour break between snatch and clean jerk testing. In this study we used relation and casual analyse. We also used synthesis, induction and deduction for elicit the conclusions utilizable for sport's use. During executing and obtaining results we used quantitative methods, mostly percentage, central tendency methods such as (arithmetic mean), rate of variance and standard deviation. For supporting reliability and credibility of our research we lean against statistical significance tests and logical opinion. P – value and corelation coefficients we were exploring via Microsoft Office Excel 2016 software. The SPSS software was used as well, even effect size was calculated.

RESULTS

For data evaluation IBM Statistics v19 has been used and Microsoft Excell 2016 software as well. Results are presented in Figures and Table in order to better clearance. Since the aim was to figure out possible corelation of grip strength with snatch and clean & jerk performance and we couldn't rely on normal distribution of data due to low number of subjects and their different bodyweight categories we used non parametric method – Spearman corelation test supported with calculation of effect size for reveal any significant positive or negative relations between grip strength of right and left hand, bodyweight, snatch performance and clean & jerk performance respectively. Results are presented below.

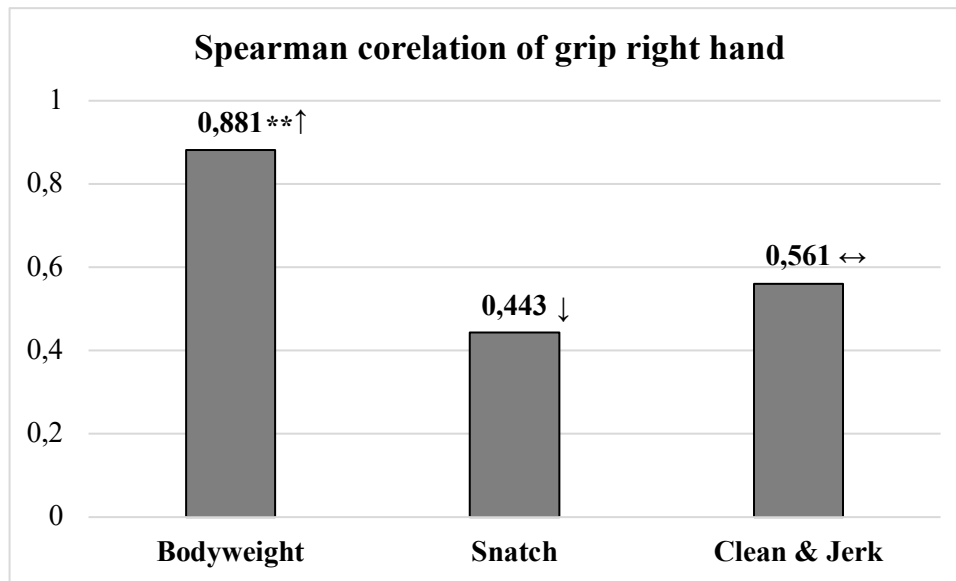


Figure 1 Spearman' correlation of grip strength R with others variables
 Legenda: ** $p < 0.01$, ↓ small effect size, ↔ medium effect size, ↑ large effect size (r^2)

On **Figure 1** you can see, that there is significant positive correlation with large effect size between grip strength of right hand and bodyweight and so grip strength is highly affected by bodyweight of competitor. We found no significant correlation between grip of right hand and snatch performance with small effect size and same we can tell about grip strength and clean & jerk correlation but with moderate effect size. Therefore grip strength doesn't seem to play major role in snatch and clean & jerk performance.

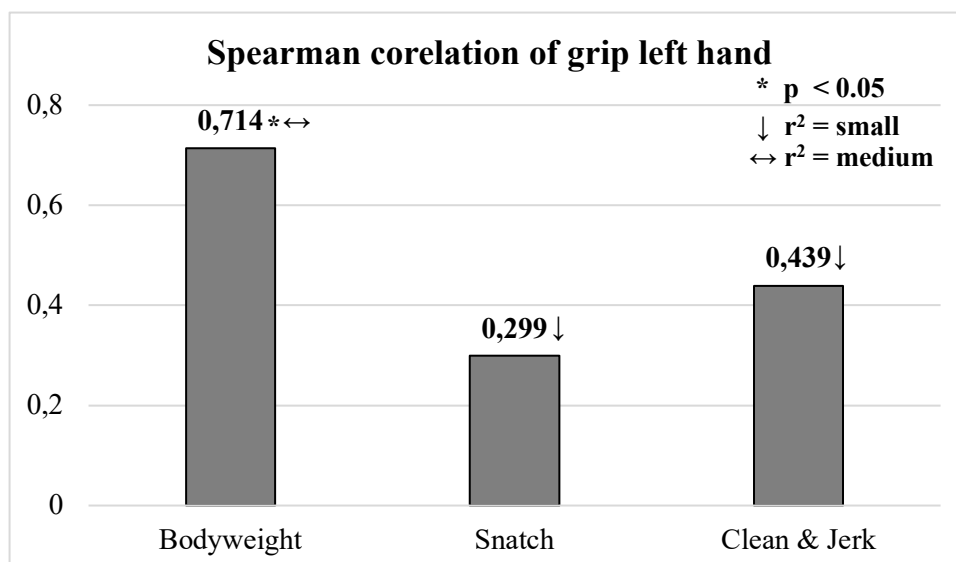


Figure 2 Spearman correlation of grip strength L with others variables

Figure 2 presents comparison of left hand grip strength with bodyweight, snatch and clean & jerk performance. As you can see there is significant strong correlation between left hand grip strength and bodyweight variable with moderate effect size. Same as with right hand, bodyweight seems to highly affect grip strength of left hand in weightlifters. We didn't find any significant correlation between left hand grip strength and snatch as well as clean & jerk performance, so that these performances are not highly affected by grip strength level.

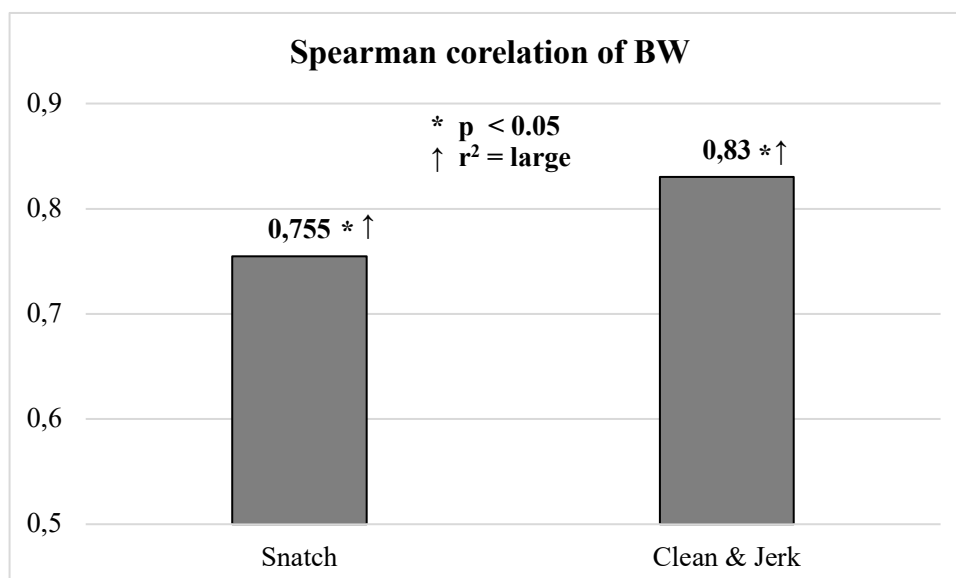


Figure 3 Spearman correlation of BW with others variables

In **Figure 3** you can see correlation of bodyweight with snatch and clean & jerk performances, where we naturally found significant correlation supported with large effect size, which is of course only confirmation of correct need of weight categories in weightlifting.

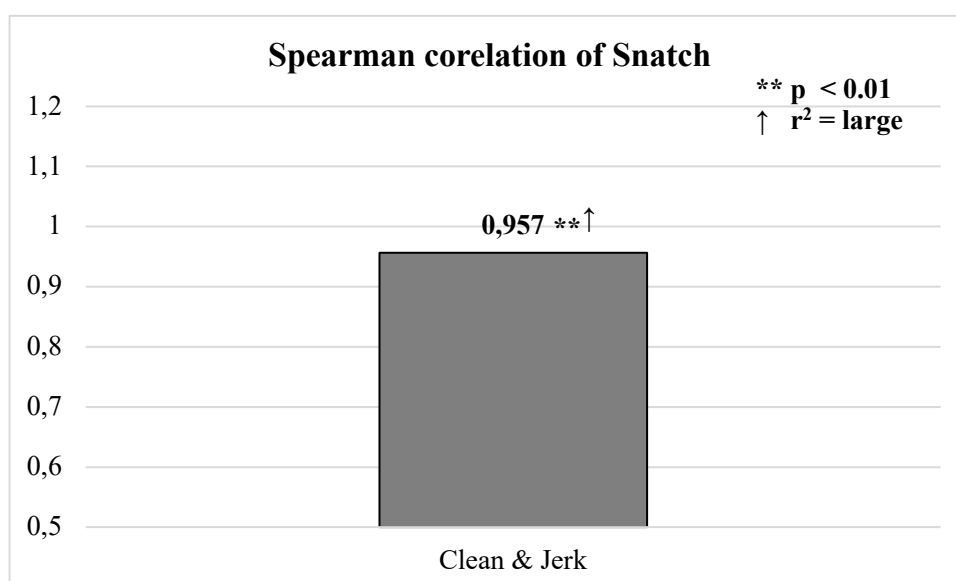


Figure 4 Spearman correlation of Snatch performance with others variables

Finally, **Figure 4** is presenting correlation between snatch performance with clean & jerk performance, where surprisingly we found significant positive correlation with large effect size. It means, that according snatch performance we could predict success of clean & jerk performance and total performance on competition, but it is important to note, that many weightlifters have their favourite move and according that, they concentrate on its improving in order to achieve better total rank during competition.

For data integrity in **Appendix B** you can see the ranks of each tested weightlifter from most important competitions in 2016/2017 and also collected information and measurements of our research.

DISCUSSION AND CONCLUSIONS

In a sport community there are a lot of assumptions about importance of grip strength in weightlifting. Majority of authors don't see grip strength in weightlifting as essential factor affecting weightlifting performance. Kipp and Harris (2017) are talking about extensors strength importance, Siahkouhian, Azimi and Hedayatnejad (2016) found strongest correlation between weightlifting performance and LBM, or we can assess weightlifting performance from vertical jump results (Coggins, McInnis and Bailey (2017).

Our research confirmed, that grip strength doesn't seem to be that important in snatch and clean & jerk performance, since we found no significant correlation between these variables. However, we found significant correlation supported by large effect size between grip strength of dominant and non dominant hand with bodyweight, also between bodyweight and weightlifting performances and finally between snatch performance and clean & jerk performance. The fact, that grip strength of both dominant and non dominant hand is linked to bodyweight and more importantly that snatch performance is significantly affecting clean & jerk performance should be taken away for weightlifting coaches, who should concentrate on improving snatch performance. It is important to note, that between dominant and non dominant hand we found significant difference in grip strength, but in weightlifting the more important is summation of both hands grip strength when irradiation and cooperation between muscle groups is occurring and that allows better strength transfer and force production.

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Appendices

APPENDIX A

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APPENDIX B Ranks of weightlifters from most important competitions

Table 1 Ranks of weightlifters from most important competitions

	Olympic Games 2016	World Championship 2017 (Snatch, C&J, Total)	European Championship 2017 (Snatch, C&J, Total)	National Championship 2017
n1				1
n2			8,12,10	4
n3	18		17,12,14	x
n4				1
n5			14,12,13	2
n6		6,10,6	1,4,3	1
n7				4
n8				2

Table 2 Information about weightlifters and measurements

		Grip strength (N)				
	Age	Right	Left	Bodyweight	Snatch (kg)	Clean & Jerk (kg)
n1	22	492,4	408,6	90,42	130	170
n2	26	421	399	104,8	172	193
n3	30	495,3	502,7	112,46	166	204
n4	21	418,8	344,1	83,71	140	170
n5	30	411,6	406	81,03	140	170
n6	24	533	538,4	94,87	125	150
n7	19	340,2	270,7	73,03	100	118
n8	18	400,7	385,7	76,59	117	143