

# A QUESTION OF TRAINING METHODOLOGY: DO WE NEED BACK SQUAT IN THE PREPARATION OF WEIGHTLIFTERS?

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## Abstract

The paper deals with questions of competitive (snatch and clean&jerk) and special assistant exercises (e.g. squats) in weightlifting. Information is given about the difference of the effect of front squat and back squat exercises, concerning the technique and strength development. Attention is paid to the advantages of application of front squat exercises on the trainings of olympic lifters.

**Keywords:** biomechanics clean&jerk, front squat, intensity, Olympic lifting, training load

## INTRODUCTION

From point of view of special training methodology in weightlifting (olympic lifting) we apply 2 types of exercises. The first group involves the classical lifts (competitive exercises) – after the abolition of press (1973) we differentiate only snatch and clean&jerk – the second one is the group of special assistant exercises. The squat exercises belong to the second one. The squat can be performed as a front squat (the barbell is on the chest of the lifters) and as a back squat (the barbell is on the shoulders of the competitors). Let me mention, that some authors (e.g. Ajan, Baroga, 1988) use only squat and front squat expressions, so squat is the same as back squat.

It is evident, that a good weightlifter is strong and has good (appropriate) technique. Therefore on the trainings special attention should be paid to develop the strength and to improve the technique. It is clear, that the back squat exercise is not suitable for technique improvement, because the body position is rather different from the one, applied in case of competitive exercises in olympic lifting. However, the back squat exercise – which is one element of the powerlifting competitions – is an excellent lift for strength development, dominantly for strengthening the muscles of legs. In this paper – from point of view of training methodology – the following question is analysed: is it necessary to apply back squat exercises for successful preparation of olympic weightlifters? Of course this question is valid only for weightlifting, because the athletes in other sport branches – e.g. track and field – apply frequently back squat exercise for strength development.

## COMPETITIVE EXERCISES AND SPECIAL ASSISTANT LIFTS FOR PREPARATION OF WEIGHTLIFTERS

I do not want to go into details about the questions of training methodology, concerning the different training periods – preparation period, precompetitive period, competitive period – but I should stress for understanding the later written information, that the ratio of strength development and technique improvement is a function of the date of important competitions. It is a fact, that the improvement of technique (and stabilization of proper technique) can be carried out only using competitive exercises, so the volume of snatch and clean&jerk exercises will be dominant if we are closer and closer to the major competition. On the other hand the role of general strength development (e.g. using back squat lifts) decreases, however in the preparatory period these exercises are the dominant ones.

Of course we have to understand that the technique improvement – the minimum intensity is 70-75 % - means in the same time dynamic strength development, even sometimes maximum strength development, when the number of repetitions is 3. How to explain the previously written information? It is not difficult! During the training if we would like to improve really the technique, and we apply approx. 80-85 % intensity lifts, the maximum number of repetitions is in general 3. The lifter can not perform more than 3 lifts – in case of clean&jerk definitely not – surely the last (third) lift means almost maximum lift exercise (because of the tiredness, fatigue), so this intensity is suitable for maximum strength development, as well. (Intensity is the % of the lifted weight to the maximum result of the lifter in this exercise).

Of course if we perform an exercise (e.g. back squat) on the training, having different motion structure than the classical lifts need, we can not expect improvement for the technique, but it is suitable for strength development. Therefore no

question about the importance of application of squat exercises in the training programs of weightlifters. And – in dependence of the speed of execution of the exercises – we can apply it even for dynamic strength development, as well. But there is a questions, what we have to answer: what is more suitable from point of view of performance development of lifters, the front squat or the back squat?

Concerning the number and ratio of special assistant exercises on the training of weightlifters the opinions of the coaches are rather different. The famous book of Arkady Vorobyev (1981) informed about 62 different assistant exercises. However, to the opinion of the world-famous bulgarian coach, Ivan Abadjiev (1997) – who trained a lot of athletes, producing world records and gold medals on world championships and olympic games – there are only 2 lifts (the 2 squats) which are really important, all the other exercises have practically a negligible role in preparation of adult lifters. Definitely, the difference between 2 exercises and 62 exercises is really significant! Let us see some others, who are in this huge range, between the given 2 and 38 different exercises!

In his book Hanzlik (1981) writes about 38 such types of assistant exercises, and to his opinion we should use all these lifts in the process of training preparation of olympic lifters. In the book of Feher (2006) we can find 28 proposed assistant exercises, and the Club Coach Manual, published by IWF contains (Jones et al., 2010) 21 exercises. Geza Toth (1970) – who died in 2011, and had been long-long years a very successful hungarian lifter, being world and European champion (and my PE teacher in grammar-school) - mentioned in his book about weightlifting 14 such types of exercises. The romanian selected team training plan involved 10 special assistant exercises (Ajan, Baroga, 1988). But all specialists of weightlifting have the similar opinion about the role of squat exercises, because the most commonly used assistant exercise is the squat (both squats). These lifts are of extraordinary importance in preparation of lifters, and even in preparation of athletes of other sport branches (Carl, 1976)(Giurkow, 1993)(Jones, 1993)(Jakovou, 1997)(Feher, 2007).

#### PERFORMANCE OF LIFTERS IN FRONT SQUAT AND BACK SQUAT EXERCISES

I think that the majority of weightlifting coaches can agree with the opinion, that supposing that the best result of a weightlifter is 160 kg in snatch and 200 kg in clean&jerk, the competitor can produce appr. 230 kg in front squat and

290-300 kg in back squat. So back squat is still the „king” of the lifts, because the lifter can produce the highest result in this exercise. However the gap (difference) between the back squat and front squat result can be reduced (slightly or significantly) if the lifters pay more attention to perform front squat exercises on the training, improving the efficiency of the front squat lift.

Of course the differences in individual cases can be significant. An excellent lifter of the previous years, Mark Huster from Germany (lifter in the 85 kg category, olympic silver medalist in Sydney) had as best result in clean&jerk 213 kg, but his best back squat result was „only” 280 kg. On the contrary, Henry Mark from USA (a former powerlifter) produced 400 kg as maximum back squat result, but his best clean&jerk performance was only 220 kg in the +105 kg category. (He was the heaviest lifter in the history of modern weightlifting at the Olympic Games with his over 180 kg bodyweight.) Let me mention that to the opinion of Poliquin if your front-squat strength is less than 85% of your back-squat performance, then you have a structure inbalance ([www.charlespoliquin.com](http://www.charlespoliquin.com)). To his mind the front squat can be used to test flexibility in the upper body and lower body, as well.

It is evident, that the result in front squat is significantly over the best performance in clean&jerk, which is a competitive exercise. The reason – although the front squat is a part of the clean&jerk lift, surely the lifter has to stand up with the barbell on the chest from the squat position – is the following: during the execution of the clean&jerk attempt first the lifter has to pull up the barbell from the platform to the necessary height – in a single movement from the platform to the shoulders, while bending the legs – and finishing with jerk, controlling the weight in a fully extended arms and legs position, waiting the signal to replace the barbell on the platform.

So to perform a clean&jerk lift is much more difficult (and longer!) than a simple front squat lift. In consequence of the fact, that the position of the body and barbell system is the same during the execution of the front squat and the competitive clean&jerk exercise, it is suitable to apply the front squat lift for improvement and stabilization of the technique of the lifter, as well, and not only for strength development. Of course the optimum technique is always individual and can be charaterized from point of view of biomechanics, producing maximum efficiency (Szabo, 2012).

The result in back squat is – in general – significantly more than in front squat. It seems to be a contradiction, since the barbell and the lifter (the musculature of the lifter) is the same in both cases. But the significant difference can be explained by biomechanical reasons. During execution of the back squat lift the body position of the lifter is more favourable – angle relations of the joints, difference between the center of gravity of the body and the barbell, measure of the rotating moments – from point of view of biomechanics, so the efficiency of the motion is better. In consequence of this fact the result in back squat is appr. 20 % (sometimes much more) over the performance in front squat. So, the same weight can be lifted easier with back squat than with front squat. Even, that weight which is over the biological limit of the lifter in front squat, belongs to the rather easily tolerable load in back squat lift.

#### DO WE NEED BACK SQUAT?

Vasily Ivanovich Alexejev (1942-2011) was a russian weightlifter, who lifted 79 world records during his very successful lifting career and he was 2 times olympic champion (1972, 1976) in the super-heavyweight category. Having a personal discussion in the weightlifting section of the Sport Club of Institute of Nuclear Research, Dubna (Moscow region) in 1977, he told me that the application of back squat exercises in the training of weightlifters is practically not necessary (Alexejev, 1977). (In the same time I would like to mention, that Alexejev applied back squat exercises not in negligible ratio in the first years of his career as a top athlete. His article, written about his own training system and load in the 1974 year and published in 1977 is the proof of this fact (Alexejev, 1977).

My objection (in agreement with the opinion of Maslobojev Jury Vasilyevich, the head coach of the weightlifting team in Dubna) – purely from point of view of training methodology – was doubled. The first, that the efficiency of the training load is a function of training volume (the sum of lifted kg-s, e.g. 10 tons on one training workout), and because the biggest lift can be achieved in back squat, we can increase the volume putting back squat exercises into the training plan. So supposing that the lifter performs 20 lifts with 250 kg barbell in back squat, the volume is 5 t. However, if the lifter performs lifts with the similar intensity in front squat with appr. 200 kg, the volume is only 4 tons, so the volume of the training is significantly less.

The second reason is, that the development in performance needs training load close to the

physiologically acceptable maximum (intensity and volume). So, only the lifts, carried out with really huge (bigger and bigger!) weights represent for the lifters such types of stimulus, which – if the answer of the organism is adaptation – realize the physiological fundament of performance-improvement. (Of course after the load we need a regeneration, as well.)

I was giving to the previously mentioned arguments, concerning the application of back squat, a third and a fourth reason, as well. To the latin saying variability is enjoyment and recreation (*varietas delactat*), so from psychological point of view it is much better to perform several different exercises on the training. Furthermore, from the squat lifts, performed with the same weights the lifters enjoy better (because of smaller relative intensity) the back squat exercises opposite to the front squat ones. So the lifters perform the back squat lifts with pleasure.

For Alexejev to answer my objections was not a problem. To the first one the answer was the following: yes, one element for characterisation of the efficiency of the training load is the volume, but the second element is the intensity, and intensity is more important, than volume. He tried to explain his opinion: if the best front squat result is 200 kg, and the lifter performs a lift with 180 kg, the intensity is 90 %. The situation is similar to the case of back squat: if we suppose that the best result is 250 kg, to lift 225 kg means the same 90 % intensity, although the weight is 40-50 kg more. So, lifting 180 kg in front squat we can reach the same effect as lifting 225 kg in back squat. Let me mention, that this opinion is in rather good coincidence with the opinion of another coach, Alexej Medvedev (1997), who said, that a very good parameter for characterisation of the efficiency of the training is the number of lifts, performed in the intensity range, reaching (or over) 90 %.

The answer to the second objection was also about the intensity. It is true – he said – that from point of view of performance-development we need stimulus, close to the limit-loadability (close to 100 % intensity!), but we have to stress that not the absolute load (in kg), but the intensity is dominant. And you should not forget – the same intensity means in front squat less kg because of biomechanical reasons – that the recovery process of the body after the workout with smaller weight is faster. So finally the loadability will be better. And another advantage of application of front squat instead of back squat is the question of technique improvement. Application of front squat during the training can

help in correct execution of the first part of clean&jerk competitive exercise, and stabilization of clean, because of the same body position of the lifter during the lifts.

Let me mention here – concerning the previous statement – the remark of Abadjiev (Abadjiev, 1997), who said, that it is not bad if a violonist plays sometimes piano, as well, but a master violonist has to play dominantly violine, constantly and long hours daily. So – speaking about weightlifting – the lifter has to perform mainly competitive exercises on the trainings. Performing exercises when the body-position is the same (or very similar) to the one on the competition platform. However in case of back squat the position of the body and the barbell is rather different from the position in competitive situation.

Concerning the third and fourth objections, Alexejew was only smiling. You should enjoy not the training – he said - but the feeling that in consequence of efficient training workouts you will be more powerful and successful competitor! And for rest or recreation You should perform not back squat lifts, but after the special work You need some assistant sports, like light athletics, volleyball, table tennis, which are my favourite sport branches – he added. And on the trainings You should perform exercises, which are useful both for strength development and technique improvement. Front squat is such type of exercise, therefore my proposition is to apply front squat instead of back squat – said Alexejev the closing words of our discussion.

Let us see another and final argument, concerning the advantage of using front squat lifts from point of view of muscle activity of the human body. The front squat is easier on the knees compared to the back squat ([www.charlespoliquin.com](http://www.charlespoliquin.com)). Biomechanical analysis indicates that the front squat places less compressive forces on the knees. In other words, the front squat works the quads harder with less stress on the knees. EMG data suggest that the

front squat is more effective than the back squat for activating the vastus lateralis and the rectus femoris.

## CONCLUSIONS AND PRACTICAL APPLICATIONS

I do not think that there is only one pathway to the top of the mountain; I do not think that there is only one unique training system! There are different coaches, different conceptions of training and of course there are different competitors, as well, who have different need concerning the loadability, technique perfection, and strength development and regeneration methods. Although the training plan should be constructed always on the basis of general and correct principles of biomechanics and physiology, but the practical work should be in every case rational, actual and individual, taking into consideration the characteristic parameters of the given athlete.

During the training of my lifting career I had been using a lot of squats, but dominantly back squat lifts. I myself – similarly to many other lifters – willingly used back squat exercises and front squat lifts belonged not to my favourite lifts. However I am sure that having the today knowledge that time I would have used much more front squats in the training process. *Tempora mutantur, et nos mutantur in illis.* (Time does fly, but we change ourselves, as well.)

How to determine recently the ratio of the 2 types squat exercises on the training – this is the right and the responsibility of the coach. So I do not say, that there is absolutely no need for back squat! However my proposition is to think over the advantages of application of front squat lifts, and compile the training plan for lifters on the basis of the written information.

Of course there is no doubt about the utility of front squat. But the topic is open for later discussion: do we need back squat for preparation of weightlifters?

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