Relationship between Squat Mobility with Snatch and Clean & Jerk Technique

Nur Ikhwan Mohamad, Ahmad Alhussin Alali, Nor Fazila Abd Malek & Ali Md Nadzalan

Faculty of Sports Science and Coaching, Sultan Idris Education University, Malaysia

Corresponding: nur.ikhwan@fsskj.upsi.edu.my

Abstract. The purpose of this study is to find if the mobility of the body effect on the Olympic lifting technique performing. Participants of this study involved 22 males and 22 females students Faculty of Sport Science and Coaching aged 20-24 years old. Participants were instructed to perform 3 repetitions of overhead squat mobility performance first, using only their own bodyweight without any equipment at all. Finished with that, participants were then instructed to performed 3 repetitions of snatch technical performance and proceed to the clean and jerk technical performance using the custom-made plastic pipe bar or 20-kg Olympic bar without plate. Result showed that all students had ‘Good’ quality of mobility required for the technical performance of snatch, clean and jerk, however practical test indicated a mastery or quality of the technical performance for the snatch was just considered as ‘Fair’ for the male, with the female students scores dip into the ‘Poor’ level of performance. For both genders, all students have a poor technical performance quality for the clean and jerk exercise.

1. Introduction

The olympic-style lifts can include pulls from hang, below the knee and other various heights but all have the commonality of high velocity, leading to high power output [1]. The snatch is often described as the more technical event and is characterized by greater speed, while the clean and jerk requires more brute strength, and is characterized by greater force production.

The weightlifting lifts are snatch and clean and jerk and importantly the derivatives such as the pulls which can be referred to as Olympic-style lifts [2]. These movements all require great balance, coordination and flexibility which are some of the physical qualities required in sports that have been found to be improved as a result of weightlifting [3]. The use of multiple joints and major muscle groups in weightlifting and the resultant improvements in neuromuscular co-ordination may lead to a reduction in injury risk due to the strengthening of connective tissues and improved balance. Indeed showed that injuries in weightlifting are less than in other common sports such as basketball, football and gymnastics.

Speed, agility and power performance is not just relying on foundational muscular strength abilities alone. Studies have indicated that muscular strength alone will not be sufficient in ensuring excellent speed, agility and power performance in any complex movement of the human body [4]. One of the factors that influence speed, agility and power is mobility.

Mobility, which can literally can be translated into the ability of the joint angle of the body to move and function at their full range of motion, in accordance with the intended functional movement is
another factors that should be considered. By having a good mobility, one can be expected to be able to learn and master certain movement of exercises important to the development of speed, agility and power. The two most common general power based exercises for speed and power development are the snatch exercise and the clean and jerk exercise. Both are also the event for the sports of weightlifting. Yet again, as reminder, physical based athletes from sports such as rugby and track sprinting perform both weightlifting exercises, at certain phases of their training for the benefits of speed and power properties produced by both of it. Thus, training using weightlifting exercises for other sports performance enhancement is different from using weightlifting as exercise for weightlifting sports.

Sports science, especially in the field of strength and conditioning, requires knowledge and skills that can only be properly learned and well-understood after the involved individual able to perform the movement related to the knowledge physically on his or her own. Some may have different opinion, but as in this case, this is the opinion.

In educational set-up nowadays, the advancement of digital technology making current lifestyle in all parts of life becoming fast paces, including teaching and learning process. The learning outcome in the form of both knowledge and practical competency were desperately push to be obtained at the shortest time possible. Translated into current condition of this study, part of the learning outcome for speed, agility and power related course of 14-weeks duration is, to be able to explained and have practical competencies in speed, agility and power based exercises (i.e., the snatch and the clean and jerk). As both exercises considered as a complex movement requires certain physical capability, some questions arise. One of it is, will the practical part of the learning process will be influenced by mobility level of the students?

Thus, with this question, the main purpose of this case study is to determine the relationship between current physical capability of students enrolling in speed and power based course (as measured by mobility performance), with the ability to learn and perform the technique of the snatch and the clean and jerk exercises at the end (technical performance regardless of external load lifted).

2. Methodology

2.1. Participant

The study is an experimental case study, profiling strength and conditioning course’s participants in term of technical performance of selected power based exercises. The study involved one single testing occasion, with qualitative assessment on technical performance by the participants were made by the course lecturer, converted into quantitative data in the form of 5-points scale of performance quality.

Forty-four students aged 20-24 years old that had underwent a “Speed, Agility and Power” course for 12 weeks had involved in the technical performance test which contributed the data of this study. Participants were informed on their individual assessment result immediately after the test. Intention to publish were made known, and consent for voluntarily participation by allowing their technical performance test data to be used for the purpose of this study, were obtained from all participants after 3 weeks of the test. This to ensure voluntarily participation, allowing participants to disapproved usability of their data without fear of losing marks, when the course had ended with all course-works marks had been given.

2.2. Procedure

All participants had been informed of the technical test date, time, location and protocol at the beginning of the course and reminded 2 weeks prior to the test. Participants attended one testing occasion. The testing session starts with 5-10 minutes of time given for familiarization and/or physical and mental preparation by the participant. Once ready, the participants were given an android device containing the Google Form link already opened, for them to key-in their identification number and contact details. The already online android devise were then given back to the assessor (the researcher), to be used for marks key-in later on.
The participants were then instructed to perform 3 repetitions of overhead squat mobility performance first, using only their own bodyweight without any equipment at all. Finished with that, participants were then instructed to perform 3 repetitions of snatch technical performance, using the custom made plastic pipe bar or 20-kg Olympic bar without plate. Participants were then proceed to the clean and jerk technical performance, again by using only the plastic pipe bar or the 20-kg Olympic bar without plate. The choice of using either the pipe or the Olympic bar were given so that the participants can choose whichever the best for them, as long as they can perform the technical performance of both exercises with their best effort as possible. After each performance, the assessor immediately key-in the score and announcing it loudly their scores. Each participants were also given chances for two to three times to repeat any of their performance if they thought that they can improved more. Once the participants and assessor satisfied that no more attempt can made any more differences, the scores keyed-in were then submitted digitally to the data based on the spot. Copy of the result were also emailed automatically by the database to the involved participants.

2.3. Data and Statistical Analyses
Scores given by the assessor were then transferred into MS Excel sheet for further statistical analyses. Normality test performed indicated normal distribution of data statistically, allowing for parametric statistical test to be used. Descriptive profile of performance from the 5-points scale were produced in the form of mean and standard deviation, indicating centrality of data and average level of performance produced by participants. Correlation analysis were performed between the two exercises (snatch and clean & jerk) with overhead squat mobility performance data.

3. Result
Table 1 showed scores of five points scale of performance quality comparison (1=very poor; 2=poor; 3=Fair; 4=Good; 5= Excellence) mean and standard deviation for squat mobility, snatch technique and clean & jerk technique between male and female.

As indicated in Table 1, all students have ‘Good’ quality of mobility required for the technical performance of snatch, clean and jerk. However the outcome of the practical test (Table 1) indicated that mastery or quality of the technical performance for the snatch was just considered as ‘Fair’ for the male, with the female students scores dip into the ‘Poor’ level of performance. For both gender, all students have a poor technical performance quality for the clean and jerk exercise.

Table 1. Mean and Standard Deviation for Squat Mobility, Snatch Technique and Clean & Jerk Technique

|                  | Male (N=22) | Female (N=22) |
|------------------|-------------|---------------|
| Overhead Squat mobility | 4.45 ± 0.91 | 4.22 ± 0.81   |
| Snatch Technique | 3.14 ± 1.64 | 2.78 ± 1.54   |
| Clean & Jerk Technique | 2.09 ± 1.34 | 2.36 ± 1.36   |

The overhead squat mobility has been shown to significantly correlate as shown in Table 2 with the snatch technical performance among the students, but not with the clean and jerk exercise.

Table 2. Correlation between Overhead Squat Mobility with Snatch and Clean & Jerk Techniques

|                         | Overhead Squat Mobility | Sig. |
|-------------------------|-------------------------|------|
| Snatch Technique        | .506**                  | .000 |
| Clean & Jerk Technique  | .434**                  | .003 |

**Correlation is significant at the 0.01 level (2-tailed)**

If based on gender, the male students snatch technical performance significantly correlate with the overhead squat mobility performance. But it seems that the clean and jerk performance is not significantly correlate with the overhead squat mobility ability among the male students as shown in Table 3.
Table 3. Correlation between Overhead Squat Mobility with Snatch and Clean & Jerk Techniques for Male Only

|                  | Overhead Squat Mobility | Sig.  |
|------------------|-------------------------|-------|
| Snatch           | .466*                   | .029  |
| Clean & Jerk     | .354                    | .106  |

*Correlation is significant at the 0.05 level (2-tailed)

In table 4, data analysis from the female students on the other hand indicated that both the snatch and the clean and jerk technical performance were significantly correlate with their overhead squat mobility performance.

Table 4. Correlation between Overhead Squat Mobility with Snatch and Clean & Jerk Technique for Female Only

|                  | Overhead Squat Mobility | Sig.  |
|------------------|-------------------------|-------|
| Snatch           | .538**                  | .010  |
| Clean & Jerk     | .566**                  | .006  |

**Correlation is significant at the 0.01 level (2-tailed)

4. Discussion and Conclusion

The purpose of this study was to find if the mobility of the body effect on the Olympic lifting technique performing. Stone et al. [5] suggested that factor such as speed, mobility and technique may be more important to weightlifting performance among women after weak correlation between maximum strength and weightlifting performance among women was found in their study. Storey and Smith [6] stated that, to perform snatch lifting, there are requires to have a greater mobility because of the wide grip on the barbell overhead in a bottomed-out squat position. In this study were found a “good” quality of mobility required for the technical performance of snatch, clean and jerk. In other study by Chiu and Burkhardt [7] also have stated that proper execution of squatting motions can help to the performance of advanced resistance training exercises, such as the snatch and clean. However, in this study has showed the practical test indicated that mastery or quality of the technical performance for the snatch was just considered as “Fair” for the male with the female students scores dip into the “Poor” level of performance. For both genders, all students have a poor technical performance quality for the clean and jerk exercise. The overhead squat mobility has been shown to significantly correlate with the snatch technical performance among the students, but not with the clean and jerk exercise. The male students snatch technical performance significantly correlate with the overhead squat mobility performance. But it seems that the clean and jerk performance is not significantly correlate with the overhead squat mobility among the male students. The data analysis from the female students on the other hand indicated that both the snatch and clean and jerk technical performance were significantly correlate with their overhead squat mobility performance. This study was contrary with Blackwood [8] that overhead squat implemented can benefit to Snatch skill transfer exercises. While study by Takano [9] also stated that after student mastered in overhead squat their supposedly can have a better learning progression on clean & jerk and snatch lifting.

In the end, the mobility of the body has a deep influence on performing the Olympic lifting snatch, clean and jerk exercises, a big amount of students were not able to perform the Olympic lifting properly even after enrolling for 12 weeks in the speed, agility and power course, all forty-four students have a poor technical performance quality for the clean and jerk exercise. Mobility has been shown to significantly correlate with the snatch technical performance among the students, but not with the clean and jerk exercise. The male students snatch technical performance significantly correlate with the overhead squat mobility performance. But it seems that the clean and jerk performance is not significantly correlate with the overhead squat mobility ability among the male students.
students data analysis from the female students, on the other hand indicated that both the snatch and the clean and jerk technical performance were significantly correlate with their overhead squat mobility performance. More research are needed on this topic to help lecturers/instructors to understand why the students are not able to perform the correct technique of the Olympic lifting.

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