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ORIGINAL ARTICLE

Unified bench press through the elimination of leg-drive to promote sports inclusion

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Abstract

Background and Study Aim Among the weightlifting disciplines we find the bench press in Powerlifting and Para Powerlifting, which are very similar. They have never been combined for several reasons, the most important of which is the use of two different barbell lifting techniques. Unlike Para Powerlifting, Powerlifting in the bench press involves the use of leg-drive, i.e. leg thrust, which is considered one of the possible determining factors for the success of this exercise. The aim of the study was to test whether the elimination of the leg-drive technique in Powerlifting, followed by a protocol of adapting to the Para Powerlifting technique, without leg-drive, made a difference in terms of lifting the maximum load (1RM).

Material and Methods The subjects were 10 male amateur athletes (22,3 ± 2,4 years old). The training protocol, administered for 2 weeks, consisted of finding the best possible position on the bench in the absence of leg-drive. The 1RM test with leg-drive and 1RM without leg-drive were administered. A dependent-samples t-test was used to compare the differences in 1RM test using the two techniques.

Results The result was not statistically significant ($p > .05$), as the maxima with the two techniques remained unchanged. Discussions. Para Powerlifting technique, without leg-drive, in bench press, allows athletes without disabilities to lift the same weights as the leg-drive technique, or slightly less.

Conclusions The results obtained are promising and the study, if extended and focused on high-level athletes with positive results, could open a new page in sport, representing a new step in sport towards inclusion.

Keywords: powerlifting, inclusion, strength, strategies, performance gap.

Introduction

The bench press is one of the disciplines of weightlifting, which belongs to the Italian Weightlifting Federation (FIPE). It consists of assessing the maximum abduction force of the extensor chain of the upper limbs performed with an opposite movement [1]. The bench press competitions take place in compliance with the specific Technical Regulations, according to the Federal Programme of Competitive Activities approved annually by the FIPE Federal Council. Over the years, given the ease with which the materials for practicing this discipline can be found and the simplicity with which the athletic gesture can be performed, it has also become widespread among people with disabilities [2]. The World Para Powerlifting is the international Paralympic weightlifting federation based in the German city of Bonn. We have different examples where the records of Paralympic athletes are close to those of athletes without disabilities, yet they compete separately for several reasons. The distension in Para Powerlifting is very similar to the traditional bench press. In general, bench press is one of the main exercises to assess upper body strength [3, 4]. The muscles involved in bench press are pectoralis major, deltoid, coracobrachialis and biceps brachii, triceps brachii and anconeus, pectoralis petit, dentate major, subclavian. The adductor muscles of the scapulae, including the gran dorsalis, play a key role during set-up and positioning.

In Powerlifting, the arch bench technique is the predominant method, the benefit of which is said to be due to the shortening of the bench's range of motion and increased leg thrust [5]. This leg thrust is called leg-drive. The use of the leg-drive has always been considered one of the possible determining factors for the success of this exercise. The alleged advantages of this technique are the improved chest set-up, which allows for an optimal thrust angle and a forceful thrust with the whole body, and not only with the trunk [6]. Due to their physical limitations, athletes with disabilities must place their legs on the bench. In fact, in Para Powerlifting there are adaptations that also allow athletes with disabilities to perform the exercise [7].

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The main adaptation consisted of placing the legs stretched parallel on the bench or tied to the bench, via supports, in regulated positions. Consequently, on a technical and practical level, there was only one substantial difference: the use of the leg drive, i.e., the push of the feet into the flat bench, which is absent in Para Powerlifting and present in Powerlifting. Not everyone agreed that leg-drive had an important influence on the load lifted. A study by Gardner et al. [8] showed that the use of the leg-drive had little influence on the activation of the muscles responsible for the technical gesture of the bench press distension. The study analyzed the electromyographic activity of the muscles in three different bench press positions (standard bench press condition, with feet and legs not in thrust, leg-drive condition and feet in the air), the results of which showed no statistically significant differences between genders or conditions for any of the three muscles analyzed. Gardner later investigated the differences in subjects without disabilities in the lifting of the 1RM in the flat bench press in a standard position and with the use of the leg-drive and did not notice any significant differences, except for a slight improvement with the use of the leg-drive, probably due to the protocol focused on adaptation to this technique [9].

Aim and hypothesis. Comparative research between athletes with and without disabilities in weightlifting is sorely lacking [10]. Consequently, the aim of the present study was to verify whether the elimination of the leg-drive technique in Powerlifting, followed by a protocol of adaptation to the Para Powerlifting technique, without leg-drive, makes a difference in terms of lifting the maximum load (1RM). This study aims to test whether the absence of the leg-drive can be a strategy to reduce the gap between the two sports, promoting sports inclusion. Our hypothesis is that an appropriate training protocol is able to help athletes with disabilities adapt to the flat bench exercise without leg drive.

Materials and Methods

Participants

10 male amateur athletes (Mean ± Standard deviation = age, 22,3 ± 2,4 years old; weight, 71 ± 11,9 kg; height, 175,1 ± 8,9 cm; weightlifting background, 1,6 ± 0,8 years) with a basic experience in weightlifting, participated in this study on a voluntary basis. The study adhered to ethical code of the Declaration of Helsinki and written informed consent was obtained from all participants, after informing them about the aim and the procedures. Data were stored and processed anonymously.

Research Design and Protocol

A one-group pretest-posttest quasi-experimental design, with a convenience sampling, was used. The training study consisted of 2 weeks + 1 day of pre-testing and 1 day of post-testing. For 2 weeks 6 training sessions were performed to try to adapt the athletes to the new weightlifting technique without the use of leg-drive. The training sessions were conducted in a private gym during COVID-19 pandemic by a qualified instructor. Each session was divided into 3 phases. The objective was to stimulate the athlete to find the best possible position on the bench with the new technique, trying to reproduce the best possible arch. The training methodology was inspired by the work of Wilcox [11], comprised a warm up, central phase and cool down, as follow in Table 1.

Data collection. The materials used were:

- A multifunctional flat bench (VIDAXL) including a knee support at the bottom to stretch the legs and feet. This compensated for the absence of a Paralympic flat bench and therefore for a flat bench with a longer length to allow the supine position;
- cast-iron discs of various weights, mats, elastic bands;
- Decathlon non-Olympic bodybuilding barbell (weight 7.75 kg; length 1.55 m; diameter 28 mm).
- iPhone XR with metronome +.

Two maximal tests were used:

- 1RM with leg-drive, to assess the maximal load lifted, administered only on entry.
- 1RM test using Paralympic bench press technique, without leg-drive, administered on entry and exit.

Statistical Analysis

After verifying the normality of the data ($p > .05$) with the Shapiro Wilk test, the dependent-samples t-test was used to test for differences between 1RM with and without leg-drive on entry, and between 1RM with leg-drive on entry and 1RM without leg-drive after 2 weeks. Data analyzes were performed using Statistical Package for Social Science software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY).

Results

Participants' characteristics are shown in Table 1.

The result showed a statistically significance between 1RM test performed with and without the use of leg-drive on entry, $t(9) = 2.71$, $p < .024$. A detailed description is shown in Table 2.

After 2 weeks, the result was non-statistically significant between 1RM performed on entry using leg-drive and 1RM performed without leg-drive on exit, $t(9) = 1.50$, $p > .168$. A detailed description is shown in Table 3.

A graph on the comparison between the maximum raised with the two techniques is depicted in Figure 1.

Table 1. Participants' characteristics

Athlete	Date of birth	Age	Weight (kg)	Height (cm)	Years of gym
Athlete 1	06\02\1999	22	70	167	1
Athlete 2	23\10\1994	26	78	185	2
Athlete 3	02\03\2000	21	66	176	2
Athlete 4	12\01\1998	23	66	163	2
Athlete 5	27\11\2000	20	46	163	0
Athlete 6	18\08\2003	18	76	170	3
Athlete 7	06\04\1997	24	80	183	2
Athlete 8	23\10\1997	23	83	180	1
Athlete 9	15\02\1996	25	85	187	2
Athlete 10	30\10\1999	21	60	177	1

Table 2. T Test for paired samples on entry

Phase	Mean ± Standard deviation	Information	T-value	df	sig
Entry	1.200 ± 1.398	Maximal With Leg Drive Maximal With Ppl Technique	2.714	9	0.024

Table 3. T Test for paired samples on exit

Phase	Mean ± Standard deviation	Information	T-value	df	sig
Exit	0. 400 ± 0.843	Maximal With Leg Drive (entry) Maximal With Ppl Technique (exit)	1.500	9	0.168

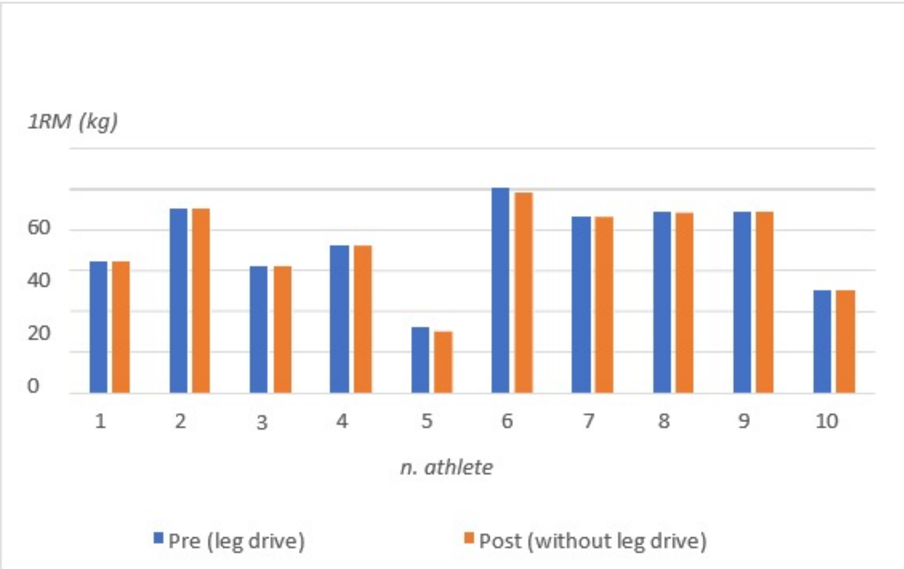

Figure 1. 1RM of 10 athletes with leg-drive (pre 2 weeks) and without leg-drive (post 2 weeks of training)

Discussion

The results showed the effectiveness of the training protocol in trying to adapt the athletes to the new flat bench technique, without the use of the leg-drive. The difference in the 1RM when using the two techniques was initially because the athletes were not used to the technique of lifting without the leg-drive. Consequently, by removing the leg-drive to lift the load, the maximal was lower. With the right preparation, it is possible to always maintain a high ceiling, but without leg drives. This promotes sports inclusion. Sporting activity plays a very important role in training and education [12, 13], in terms of physical well-being and in keeping the body and mind fit. This was recently recognised with the introduction of the specialist teacher in the last classes of primary school, as having the appropriate training [14, 15]. In general, competitions for Paralympic athletes are adapted according to the athletes' disability [16]. Efforts are made to promote inclusion in different ways: by analysing the performance model [17, 18], by reducing the performance of people without disabilities, by modifying motor or functional gestures [19], game rules and technological tools [20]. In our case, we simply replaced the bench press technique with leg drives with the Para Powerlifting technique, without leg drives. The aim was to test the adaptability of the Para Powerlifting technique to the bench press, demonstrating that its use would not compromise the amount of load lifted by athletes without disabilities. The use of the new technique, to the detriment of the leg-drive technique, does not massively affect the maximum lifted by athletes. This allows us to state that it is possible to use the technique used so far only in Para Powerlifting, even in Powerlifting, without any reduction in performance. In this way, we can annul all the theoretical speculations made about the impossibility of unifying the two disciplines. Starting with the main one, namely that the difference in techniques would create a large gap between the maximums lifted in the two competitions. It would therefore be desirable to create a single integrated discipline, but to do so would require addressing one problem, which is to eliminate the regulatory differences in terms of time. Currently, in fact, Paralympic athletes during competition have 1 minute more than athletes without disabilities to perform the test in the group system.

It is necessary to break down all barriers of prejudice and sport can be in effect a tool for integration and social inclusion. Inclusive activities are important to achieve a better perception of disability [21], change current stereotypes and promote social, cultural and educational development [22]. These results can be useful for coaches and technicians to promote sports inclusion in Powerlifting. With the right strategies, in this case the elimination of the leg-drive technique and adaptation to the leg-drive-free technique of Para Powerlifting through specific protocols, it is possible to make athletes with and without disabilities compete together; all without reducing the performance of athletes without disabilities. University education can play a significant role in helping sports science and exercise students [23, 24], to identify, based on their own experience and knowledge, the most suitable strategies for promoting sports inclusion. The sports kinesiologist, a master's graduate student in exercise and sports science, is the ideal professional figure as it is involved in competitive athletic training activities [25, 26]. With the new sports reform and the introduction of the kinesiologist, universities should work on curricula so that they are more consistent with the respective professional profiles [27, 28].

The limitations of the study are the sample size and the reference to amateur athletes with little experience in the field. Future studies could enlarge the sample and see if our hypothesis could also be valid for high-level athletes. However, as similar studies have not been found in the literature, this could be a first step in the evolution of two very similar disciplines with enormous potential. Future studies could also investigate the athlete's attentional aspect of muscle contraction during exercise, as internal focus has been found to be effective in increasing electromyographic activity [29, 30].

Conclusions

In this section, provide a concise summary of the main findings and their implications. Reiterate the key contributions of your study and how they align with the research objectives or hypothesis. Emphasize the practical significance of your results and their potential impact on the field. Avoid introducing new information or ideas in this section; instead, focus on summarizing what has been discussed in the previous sections. Consider addressing any limitations and suggesting directions for future research. End with a strong concluding statement that leaves a lasting impression on the reader, reinforcing the importance of your work.

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