



World Para Powerlifting

Research Report

Version 1.0

Version History

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Addition of Research to Future Versions



If you are aware of other research projects that aren't included in this report and could be of benefit to the Para powerlifting community, please contact World Para Powerlifting: Info@WorldParaPowerlifting.org

Introduction

Para powerlifting is one of the fastest growing Para sports, which in part is due to a comprehensive international competition calendar and a strong education and development programme.

With the sport's increase in participation and popularity, there is a growing body of academic knowledge. This report, which may be updated from time to time, has been developed by World Para Powerlifting and the Development and Education Advisory Group to support the dissemination of sport-specific academic research projects or other studies which may be of interest to the wider Para powerlifting community.

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Comparison of Post-Exercise Hypotension Responses in Paralympic Powerlifting Athletes after Completing Two Bench Press Training Intensities

Author(s): de Almeida Paz, Aidar, Gama de Matos, Fabrício de Souza, Edir da Silva-Grigoletto, van den Tillaar, Ramirez-Campillo, Yuzo Nakamura, da Cunha Costa, Nunes-Silva, de Athayde Costa e Silva, Carlos Marçal and Machado Reis

Year: 2020

Source: https://www.researchgate.net/publication/340350576_Comparison_of_Post-Exercise_Hypotension_Responses_in_Paralympic_Powerlifting_Athletes_after_Completing_Two_Bench_Press_Training_Intensities

Abstract:

Background and objective: Post-exercise hypotension, the reduction of blood pressure after a bout of exercise, is of great clinical relevance. Resistance exercise training is considered an important contribution to exercise training programs for hypertensive individuals and athletes.

In this context, post-exercise hypotension could be clinically relevant because it would maintain blood pressure of hypertensive individuals transiently at lower levels during day-time intervals, when blood pressure is typically at its highest levels. The aim of this study was to compare the post-exercise cardiovascular effects on Paralympic powerlifting athletes of two typical high-intensity resistance-training sessions, using either five sets of five bench press repetitions at 90% 1 repetition maximum (1RM) or five sets of three bench press repetitions at 95% 1RM.

Materials and Methods: Ten national-level Paralympic weightlifting athletes (age: 26.1 \pm 6.9 years; body mass: 76.8 \pm 17.4 kg) completed the two resistance-training sessions, one week apart, in a random order.

Results: Compared with baseline values, a reduction of 5–9% in systolic blood pressure was observed after 90% and 95% of 1RM at 20–50 min post-exercise. Furthermore, myocardial oxygen volume and double product were only significantly increased immediately after and 5 min post-exercise, while the heart rate was significantly elevated after the resistance training but decreased to baseline level by 50 min after training for both training conditions.

Conclusions: A hypotensive response can be expected in elite Paralympic powerlifting athletes after typical high-intensity type resistance-training sessions.

Powerlifting: strength training, 1 RM vs Brzycki equation in an athlete with physical impairment)

Author(s): Victor Manuel Melgarejo Pinto, Diego Fabian Morales Loaiza, Julián Alanderex González Espinal, Oscar Orlando Rodríguez Wilcchez, Andrea Patricia Camargo Valencia

Year: 2020

Source: <https://recyt.fecyt.es/index.php/retos/article/view/73787/0>

Astract:

Powerlifting is a Paralympic sport in which maximum strength (MS) of the upper body is tested to overcome an established load in impaired persons.

Purpose: To compare the effectiveness of an MS training program of Powerlifting, according to the 1RM test vs. Brzycki equation.

Methodology: Quantitative approach research, pre experimental type, longitudinal, case study. Athlete aged 28 years old, right amputee A4 male, registered to the Boyacá League, who signed the informed consent. The athlete completed a six-cycle training program, with 3 weekly sessions of two hours each.

Results: The pretest and posttest MS data, according to 1RM, were 102.5 and 113.5 Kg, respectively; according to the Brzycki equation, 99 and 108.6 kg, respectively.

Conclusions: The effectiveness of the strength program was demonstrated, because strength increased by 11.4 kg, equivalent to 10.7% according to 1RM, and 9.5 Kg equivalent to 9.6% according to the Brzycki equation. After comparing the differences, the measurement with the equation was considered valid.

Managing parasport: An investigation of sport policy factors and stakeholders influencing para-athletes' career pathways

Author(s): Martins Patatas, De Bosscher, Derom and De Rycke

Year: 2020

Source: <https://www.sciencedirect.com/science/article/abs/pii/S1441352319302785>

Abstract:

The way disability is understood and positioned by key stakeholders informs how policies are implemented in the development of pathways to sporting excellence of an athlete with a disability. In this paper, the authors seek to identify which sports policy factors and stakeholders influence the development of athletic career pathways in Paralympic sport (i.e., attraction, retention, competition, talent identification and development, elite, and retirement phases). Drawing from the theories of disability and the literature on elite sport policy, an interview protocol on policy dimensions and principles to support para-athletes' development was created, and 32 key stakeholders from the Brazilian Paralympic sport context were interviewed. The data revealed that coaching provision and education as a policy factor and coaches with disability-specific knowledge as a stakeholder were perceived as most influential during all the phases of para-athletes' careers. The classification system emerged as a parasport-specific factor that can facilitate or inhibit the development of para-athletes' careers, influencing the implementation of policies. The authors suggest that understanding the concept of disability is notably essential when stakeholders have to think strategically and adapt management principles from able-bodied sporting contexts. Therefore, critically positioning disability within policy decision making can improve the thinking, action, and behaviour of policymakers, coaches, and sports managers, leading to the more efficient delivery of successful para-athletes' careers.

Analysis of a single session strength training with full and partial repetition in Para powerlifting athletes

Author(s): Tanise Pires Mendonça

Year: 2019

Source: http://bdtd.ibict.br/vufind/Record/UFS-2_89fa31853ce0428682637021003a27cb

Abstract:

Introduction: Paralympic Powerlifting is a sport that is not an exercise force. The training aims at gaining strength, which uses a range of motion as one of the variables for the development of maximum strength.

Objective: To evaluate the effect of a training session with partial (130% 1RM) and total (90% 1RM – use of Boards) on fatigue index (IF), peak torque (PT), time to peak torque, strength development rate (TDF), muscle thickness (USG) and muscles activation (EMG) in Paralympic Powerlifting (PP) athletes. Twelve athletes of national level of the PP participated, during three weeks (with 28.60 ± 7.60 years, $71,80 \pm 17,90$ kg) and with experience of minimum training of 12 months. An ANOVA (Two Way) was performed for repeated measures, and Bonferroni Post Hoc, with $p < 0.05$.

Results: There were no significant differences in the strength indicators (IF: 76.12 and 61.02, TDF: 640.43 and 602.78, Time: 0.72 and 0.64 and PT: 1119.68 and 771, 63N) under conditions with partial and total replications respectively. Regarding the muscular activation measured through the EMG, there were no significant differences between the muscles evaluated during the exercises. As for edema in the Clavicular portion of the Greater Pectoral Muscle (3.03 and 3.34 cm, $p = 0.001$) and External Portion (2.97 and 3.33 cm, $p = 0.001$) there were significant differences between the interventions with partial repetitions and totals respectively.

Conclusion: It was verified that the training with partial repetitions and with complete repetitions did not present significant differences in the variables of strength and muscular activation, although the training with partial repetitions was performed with greater absolute loads. Training with complete repetitions had a larger edema, which tends to provide increased fatigue during training.

Neuromuscular indicators analysis of grip width in Paralympic powerlifting

Author(s): Matos Dos Santos

Year: 2019

Source: Not available.

Abstract:

Objective: Investigate the effects in different amplitudes of the grip width in Powerlifting Paralympic (PP) athletes on dynamic and isometric muscular strength, rate of force development and muscular electrical activity.

Methods: We evaluated 12 PP athletes participating in the extension project of the Federal University of Sergipe. Age range (25.40 ± 3.30 years), body mass (70.30 ± 12.15 kg) and time of experience in the sport (2.45 ± 0.21 years). The subjects of this study are competitors at the national level, classified and ranked among the top ten of their respective categories. To evaluate the dynamic (FDM) and isometric forces (FIM), velocity, time, rate of force development (TDF) and muscular activity, a linear encoder, force sensor, and electromyograph were used. The evaluation occurred during five weeks, in first week was establish for one-repetition maximum test (1RM) and familiarization. The remaining weeks were establish to evaluations with different widths of the grip; 1x, 1.3x, 1.5x of the bi-acromial distance (DBA) and 81,0 cm between the index fingers (maximum allowed in the sport).

Results: Study 1 there was a significant difference ($p = 0,019$) in increase of velocity 1.52 ± 0.36 m/s for relative maximum dynamic force with 25% of the maximum dynamic force with the 1.5x grip width of the DBA, significant results in time (ms) ($p = 0,030$) ($p = 0,032$) ($p = 0,030$) with the 1.5x DBA grip for isometric strength with 30%, 50% and 100% (187.44 ± 85.81 ms, 312.66 ± 142.92 ms, $626.00 \pm 285,98$ ms). No difference between types of strength and muscle activity for both grip widths. Study 2 There were no differences between the different widths of the grip and distances from the bar to the chest (DBP) in FIM. The 1x DBA grip produced more FIM and TDF with the bar leaning against the chest (BP), however, there was a predisposition for grips of 1.3x DBA, 1.5x DBA and 81cm to generate more FIM and TDF (10, 20, 30 cm DBP, $653,84 \pm 256,62$ N, $859,25 \pm 293,95$ N, 1130.28 ± 390.2 N and 20 cm DBP, 2029.22 ± 1753.37 ; 30 cm DBP 1609.66 ± 1555.00 N.ms-1).

Conclusion: The grip width of 1.5x DBA provided increase in FDM and FIM, speed, time for maximum PP strength, greater activation of the pectoralis major sternal part (PME) and anterior deltoid (DA). Larger grips such as 1,3x DBA, 1,5x DBA and 81 cm promoted FIM in relation to 10, 20, 30 cm DBP. Except for FIM BP where the 1x DBA grip promoted the highest FIM. The 1x DBA grip increased the TDF with BP and with 10 cm DBP, for 20 and 30 cm DBP the 1,3x DBA grip and 1,5x DBA generated more TDF in the PP athletes.

The use of the electrical stimulation device for the muscles in the limit determines the elbow joint during the lifting of the disabled weightlifting players

Author(s): Harb Ewajela Al-Ibraheemi, Muhammad Abdulkhliq Alhasan and Isam Abdulameer

Year: 2019

Source: <https://rua.ua.es/dspace/handle/10045/94511>

Abstract:

Neuromuscular Electrical Simulation has been improved as the novel therapeutic alternative for the patients who affected with muscle impairment. It has proven significant improvement in strengthening the physical condition and the functional capacity of the patients. In this research work incorporation of Neuromuscular Electrical Simulation for the muscles in the limit determines the elbow joint during the lifting of the disabled weightlifting players. While the weights are lifting by the players without proper cautiousness and concentration the tendon and associated flexor or pronator muscles may get affected and leads to severe pain and causes disability to perform the weightlifting practice. In the process of reviving the weight lifting players different methods are used. The research study focuses on the use of electrical stimulator devices for improving the muscle strength and healing of the elbow joint injuries.

The effect of a weight control strategy in Para powerlifting performance using multivariate analysis

Author(s): Hatanaka, Kojima and Kinugasa

Year: 2019

Source: Not available.

Abstract:

Background: Para powerlifting is a sport in which an athlete with eligible physical impairments compete the weight lifted by bench press. The powerlifting athletes are divided into 10 different weight categories for each gender based on his/her body mass. It is known for powerlifting athletes with no impairments that there is positive correlation between the results of bench press and the weight categories (García-Manso et al., 2008). Therefore, the switch in the participating weight category as one of the performance strategies might lead to Paralympic podium finish.

Objective: The aim of the study was to clarify the effectiveness of changing weight category as a performance strategy to acquire superior rankings and winning medals at Paralympic Games.

Methods: Prior to confirm effectiveness of weight control, we examined the relationship between the competition performances and weight category in Para powerlifting as with the case of athletes with no impairments. We extracted data of Paralympics and World Championships from the online database by Gracenote (www.gracenote.com), and the missing data was obtained from the IPC website. The data set consist of best records of 1,096 participants (758 males and 338 females) of Paralympics and World Championships was used to relate competition performance with weight category via a regression model. Subsequently, multivariate analysis was performed to identify how the change rate in record and the change in weight category influenced in the ranking in Paralympic Games. The data of 632 Paralympic results of 235 athletes (146 males and 89 females) who participated in multiple Paralympic Games was included. The ranking data was generalized by the number of participants in each competition. We also investigated the cases where medals were won.

Results: There was moderate correlations between lifted weights and weight categories in Para powerlifting for each gender (male: $r=0.46$, $P=0.000$; female: $r=0.38$, $P=0.000$, respectively). Multivariate analysis showed that switching weight category led to improved rankings for all participants, and this strategy was also useful for winning Paralympics medals ($P=0.004$; $P=0.002$, respectively). **Conclusion:** To our knowledge, this study was the first study to systematically demonstrate the change of the weight category as a performance strategy for Para powerlifting. However, the validity of this strategy needs to be confirmed further as it may depend on each weight category. It is also important to accurately predict the borderlines of medal acquisition in the near future.

Semi-regular exercises for the rehabilitation of shoulder joint for weightlifting disabled athletes

Author(s): Harb Ewajela Al-Ibraheemi, Qasim Mohammed Al-Badri and Hameed Oudah Al-Oudah

Year: 2019

Source: https://www.researchgate.net/publication/334630261_Semi_-_regular_exercises_for_the_rehabilitation_of_shoulders_joint_for_weightlifting_disabled_athletes

Abstract:

The weight lifting athletes get injured while they are demonstrating the strength to lift the weight. It is observed mostly the shoulder joints are prone to affect due to physical imbalance or abnormal movement in weightlifting athletes. This results impair normal functional movement. The rehabilitation centers are providing the semi-regular exercises to regain their muscular strength. Muscular endurance is predominant rather than muscular strength. The rehabilitation centers are initially focusing on retain their muscular endurance and then focusing on increasing the muscular strength by practicing the semi-regular exercises. In this research work we suggest the semi-regular exercises to improve 3 different muscle contractions namely isometric contraction, concentric contraction and eccentric contractions of the skeletal muscle. The semi-regular exercises are aiming to improve the joint strength and range of motion in shoulder joint dislocation. This can be provided after two weeks of the shoulder dislocation of the weightlifting athletes with the confirmation from physician. The duration of the semi-regular exercises rehabilitation program is spanned across the period of 6 weeks to regain their muscle power and strength.

Electromyographic inter-limb asymmetry in bench press exercise in elite Paralympics weightlifters

Author(s): Aedo-Muñoz, Sánchez-Ramírez, Moya-Jofre, Bustamante-Garrido, Araya-Ibacache, Dal Bello, Ciro Brito and Miarka

Year: 2019

Source: <https://commons.nmu.edu/isbs/vol37/iss1/67/>

Abstract:

The purpose of this study was to describe inter-limb asymmetry in three muscle groups in a sample of Paralympic weightlifters during an 80% RM bench press. The sample was composed of 7 subjects belonging to the Chilean elite powerlifting. Surface electromyography was assessed in major pectoral, deltoid anterior and triceps brachii. The magnitude of the response was calculated through root mean square (RMS). Symmetry Index was calculated for an interlimb differences measure. Only the pectoralis major muscle showed significant differences between limbs (right 84.7 ± 41.3 ; left 66.1 ± 19.3 RMS) ($p=0.05$) and the SI median greatest value ($19.74 \pm 24.59\%$). Anterior deltoid showed high individual differences in two athletes with upper 80% SI values. More studies should assess asymmetry with the objective to decrease this injuries risk factor.

Effects of placebo on bench throw performance of Paralympic weightlifting athletes: a pilot study

Author(s): De Conti Teixeira Costa, Galvão, Bottaro, Felipe Mota, Duarte Pimentel and Gentil

Year: 2019

Source: <https://jissn.biomedcentral.com/articles/10.1186/s12970-019-0276-9>

Abstract:

Background: The aim of the present study was to analyse the effects of placebo on bench throw performance in Paralympic weightlifting athletes.

Methods: The study involved four Paralympic weightlifting male athletes (age: 40.25 ± 9.91 years, weight: 60.5 ± 8.29 kg, height: 1.60 ± 0.15 m) that visited the laboratory in three occasions, separated by 72 h. In the first session, the athletes were tested for bench press one repetition maximum (1RM). The other two sessions were performed in a randomized counter-balanced order and involved bench throw tests performed either after taking placebo while being informed that the capsule contained caffeine or without taking any substance (control). The bench throw tests were performed with loads corresponding to 50, 60, 70 and 80% of the bench press 1RM.

Results: According to the results, mean velocity (Δ : 0.08m/s, ES 0.36, $p < 0.05$) and mean propulsive velocity (Δ : 0.11m/s, ES 0.49, $p < 0.05$) at 50% of 1RM were significantly higher during placebo than control ($p < 0.05$). However, there were no difference between control and placebo for 60, 70 and 80% of 1RM ($p > 0.05$).

Conclusion: Our results suggest that placebo intake, when the athletes were informed they were taking caffeine, might be an efficient strategy to improve the performance of explosive movements in Paralympic weightlifting athletes when using low-loads. This brings the possibility of using placebo in order to increase performance, which might reduce the risks associated with ergogenic aids, such as side-effects and positive doping testing.

Functional characteristics of the cardiovascular system in Paralympic powerlifters

Author(s): Kalsina

Year: 2019

Source: <https://www.atlantis-press.com/proceedings/icistis-19/125922463>

Abstract:

The purpose of the study is to assess the functional status of the cardiovascular system in Paralympic powerlifters. Materials and methods. Parameters of central hemodynamics and autonomic regulation of heart rate in Paralympic powerlifters were studied depending on qualification and experience. Assessment of vegetative functions was performed according to the method of R. Baevsky with the help of the POLYSPECTR equipment (Neurosoft, Ivanovo). The Omron M3 Comfort tonometer (Japan) was used to measure heart rate and blood pressure (BPs - systolic and BPd - diastolic); the calculation of hemodynamic indicators was carried out based on generally accepted formulas. Results. The results describing the features of the cardiovascular system of Paralympic powerlifters with various sports experience are obtained. Conclusion. The development of strength in athletes with disorders of the musculoskeletal system and their adaptation to physical activity is accompanied by the functional stress of the cardiovascular system.

The Training of a Para Powerlifter: A Case Study of Adaptive Monitoring, Training and Overcoming

Author(s): Wilcox

Year: 2019

Source: <https://dc.etsu.edu/etd/3665/>

Abstract:

Paralympic athletes (PA) appear to be more prone to chronic overuse injuries from daily wheelchair or crutch use. Over half of these injuries are shoulder related which can deleteriously impact quality of life. Adaptive powerlifters (AP) are a subdivision of Paralympic athletes and are at a higher risk for catastrophic injuries as compared to their counterparts, due to the compound of fatigue and lifting of maximal weights. For this reason, it is vital to have well-designed training plans for these athletes in order to preserve quality of life and maximize performance in competition. Unfortunately, there is a lack of literature on training adaptive athletes for performance. The purpose of this dissertation is to collect and analyze monitoring data of a para-powerlifter preparing for competition over the course of a six-month macrocycle. Specifically, the intention is to 1) explore options in adaptive monitoring measures for the adaptive athlete community via para-powerlifting 2) analyze trends in the training process with such monitoring methods in fatigue and performance and 3) examine efficient and safe training methods and practices for para-powerlifting. The major findings of this dissertation are 1.) Hand grip dynamometry may be a valid monitoring tool used to gain clarity on neuromuscular fatigue within para-powerlifters. 2.) Barbell velocities may reveal trends in fatigue and recovery over the course of a training cycle for para-powerlifters. 3.) Para-powerlifters and para-athletes training for upper-body power development should likely perform bench press using a strap to secure them to the bench for enhanced stability. The significant and consistently increased force outputs the added stability enables the athlete to utilize may bring more pronounced training adaptations towards their goals. This dissertation is exploratory in nature and much more research needs to be done to give the adaptive athlete population adequate information and tools for their long-term success and safety.

Load-velocity relationship in national Paralympic powerlifters: a case study

Author(s): Loturco, Pereira, Winckler, Santos, Kobal and McGuigan

Year: 2018

Source: https://www.researchgate.net/publication/327387051_Load-Velocity_Relationship_in_National_Paralympic_Powerlifters_A_Case_Study

Abstract:

Purpose: This study examined the relationships between different loading intensities and movement velocities in the bench-press exercise (BP) in Paralympic powerlifters.

Methods: Seventeen National Paralympic powerlifters performed maximum dynamic strength tests to determine their BP one-repetition maximum (1RM) in a Smith-machine device. A linear position transducer was used to measure the movement velocity over a comprehensive range of loads. Linear regression analysis was performed to establish the relationships between the different bar-velocities and the distinct percentages of 1RM (%1RM).

Results: Overall, the correlations between bar-velocities and %1RM were strong over the entire range of loads (R^2 values ranged from 0.80 to 0.91), but the precision of the predictive equations (expressed as mean differences [%] between actual and predicted 1RM values) were higher at heavier loading intensities (~20% for loads $\leq 70\%$ 1RM, and ~5% for loads $\geq 70\%$ 1RM). In addition, it seems that these very strong athletes (e.g., 1RM relative in the BP = 2.22 ± 0.36 kg.kg⁻¹, for male participants) perform BP 1RM assessments at lower velocities than those previously reported in the literature.

Conclusions: The load-velocity relationship was strong and consistent in Paralympic powerlifters, especially at higher loads ($\geq 70\%$ 1RM). Therefore, Paralympic coaches can use the predictive equations and the reference values provided here to determine and monitor the BP loading intensity in National Paralympic powerlifters

Validity of one-repetition maximum predictive equations in men with spinal cord injury

Author(s): Ribeiro Neto, Guanais, Dornelas, Coutinho and Costa

Year: 2017

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28485383>

Abstract:

Study design: Cross-sectional study.

Objectives: The study aimed (a) to test the cross-validation of current one-repetition maximum (1RM) predictive equations in men with spinal cord injury (SCI); (b) to compare the current 1RM predictive equations to a newly developed equation based on the 4- to 12-repetition maximum test (4–12RM).

Setting: SARAH Rehabilitation Hospital Network, Brasilia, Brazil.

Methods: Forty-five men aged 28.0 years with SCI between C6 and L2 causing complete motor impairment were enrolled in the study. Volunteers were tested, in a random order, in 1RM test or 4–12RM with 2–3 interval days. Multiple regression analysis was used to generate an equation for predicting 1RM.

Results: There were no significant differences between 1RM test and the current predictive equations. ICC values were significant and were classified as excellent for all current predictive equations. The predictive equation of Lombardi presented the best Bland–Altman results (0.5 kg and 12.8 kg for mean difference and interval range around the differences, respectively). The two created equation models for 1RM demonstrated the same and a high adjusted R² (0.971, Po0.01), but different SEE of measured 1RM (2.88 kg or 5.4% and 2.90 kg or 5.5%).

Conclusion: All 1RM predictive equations are accurate to assess individuals with SCI at the bench press exercise. However, the predictive equation of Lombardi presented the best associated cross-validity results. A specific 1RM prediction equation was also elaborated for individuals with SCI. The created equation should be tested in order to verify whether it presents better accuracy than the current ones.

Neuromuscular control during the bench press movement in an elite disabled and able-bodied athlete

Author(s): Gołaś, Zwierzchowski, Maszczyk, Wilk, Stastny and Zajac

Year: 2017

Source: https://www.researchgate.net/publication/322143923_Neuromuscular_Control_During_the_Bench_Press_Movement_in_an_Elite_Disabled_and_Able-Bodied_Athlete

Abstract:

The disabled population varies significantly in regard to physical fitness, what is conditioned by the damage to the locomotor system. Recently there has been an increased emphasis on the role of competitive sport in enhancing health and the quality of life of individuals with disability. One of the sport disciplines of Paralympics is the flat bench press. The bench press is one of the most popular resistance exercises used for the upper body in healthy individuals. It is used not only by powerlifters, but also by athletes in most strength-speed oriented sport disciplines. The objective of the study was to compare neuromuscular control for various external loads (from 60 to 100% 1RM) during the flat bench press performed by an elite able-bodied athlete and an athlete with lower limb disability. The research project is a case study of two elite bench press athletes with similar sport results: an able-bodied athlete (M.W., age 34 years, body mass 103 kg, body height 1.72 m, 1RM in the flat bench press 200 kg) and a disabled athlete (M.T., age 31 years, body mass 92 kg, body height 1.70 m, 1RM in the flat bench press 190 kg). The activity was recorded for four muscles: pectoralis major (PM), anterior deltoid (AD), as well as for the lateral and long heads of the triceps brachii (TBlat and TBlong). The T-test revealed statistically significant differences between peak activity of all the considered muscles (AD with $p = 0.001$; PM with $p = 0.001$; TBlat with $p = 0.0021$ and TBlong with $p = 0.002$) between the 2 athletes. The analysis of peak activity differences of M.W and M.T. in relation to the load revealed statistically significant differences for load changes between: 60 to 100% 1RM ($p = 0.007$), 70 to 100% 1RM ($p = 0.016$) and 80 to 100% 1RM ($p = 0.032$). The flat bench press performed without legs resting firmly on the ground leads to the increased engagement of upper body muscles and to their greater activation. Isolated initial positions can be used to generate greater engagement of muscle groups during the bench press exercise and evoke their higher activation.

Biomechanical substantiation of handicap in powerlifting for athletes with a disability

Author(s): Briskin, Perederiy, Roztorgui and Zanevsky

Year: 2008

Source: https://www.researchgate.net/publication/246277932_Biomechanical_substantiation_of_handicap_in_powerlifting_for_athletes_with_a_disability

Abstract:

The aim of the research was to create a handicap model in powerlifting for athletes with a disability. Best athletes participated West Ukrainian Regional competition in 2007 were examined. The model of handicap was created on the estimation of the motor possibilities level of disabled athletes, based upon muscle testing. There is a strong positive correlation between the official competitive result and the result of muscle testing that makes clear to calculate a compensation coefficient as a ratio of its maximally possible result to the individual muscle testing result. Objectivity of muscle testing is confirmed by the significant strong correlation between the official competitive result and the result of dynamometry, and also correlation between muscle testing and dynamometry. Thanks the compensation coefficient the sportsmen with harder impairments moved to better positions. The most important role in the determination of the winners remains for the official competitive result that is proved by winners' rank stability.

Impact of athletic recovery parameters of hemodynamics in disabled powerlifters with cerebral palsy

Author(s): Tatiana, Tadeusz and Romana

Year: 2017

Source: https://www.researchgate.net/publication/316752726_Impact_of_athletic_recovery_parameters_of_hemodynamics_in_disabled_powerlifters_with_cerebral_palsy

Abstract:

Purpose: Sport as one of physical culture components renders extremely complex impact on various environments and is enormously popular. In Poland disabled powerlifting represents top world standards. Aim of work: aims at examination of impact of biological regeneration on blood pressure and pulse in CP class 4, 5, 6, 7, 8 disabled power-lifters with normal upper extremities function.

Material: The research material comprised twenty 18-30 years old disabled power-lifters with cerebral palsy and normal function of upper extremities who are active members of “Start-Impel” sports club in Wroclaw. The research was carried out in 2 identical cycles on the same disabled sportsmen. Cycle I comprised primary research, while Cycle II, as secondary research, was carried out 5 months later. The micro-cycles were identical as regards training and biological regeneration schedules on particular weekdays, which guaranteed optimal research conditions.

Results: Results of the research allowed formation of the following parameters of pressure and pulse dynamics: 1. Post-training systolic blood pressure shows increasing dynamics; 2. During training meso-cycle with biological regeneration in Group A systolic pressure parameters were considerably lower than during the meso-cycle without biological renovation; 3. Diastolic pressure measured before training in both groups remains at 70–80 mm Hg, while post-training pressure increases to 82–86 mm Hg; 4. Post-training pulse measures are always higher than starting measures.

Conclusions: Combination of strength training and complex biological regeneration has positive impact on dynamics of blood pressure and pulse hemodynamic parameters, which in turn boosts training effectiveness.

Problems of planning the stages for sports training of power lifters with lesions of the musculoskeletal system

Author(s): Byankina and Hotimchenko

Year: 2015

Source: <http://lesgaft-notes.spb.ru/en/node/8057>

Abstract:

Periodization of the sport training is the organizing principle of the entire training process. Depending on the stages of sports training the goals, objectives, content and scope of the load are defined. The training of disabled athletes has its own characteristics related to the time of disability, degree of injury, the time for start of classes, and others. These features have significant influence on the training process and its periodization. In particular, some stages may take longer or shorter time frames. The article justifies the organizational features for the planning of the training process of the disabled sportsmen engaged in powerlifting.

Selected kinematics characteristic during bench press by disabled powerlifting athletes

Author(s): Seidel, Szafraniec and Chromik

Year: 2015

Source: https://www.researchgate.net/publication/296701601_Selected_kinematics_characteristic_during_bench_press_by_disabled_powerlifting_athletes

Abstract:

Background & Study Aim: The main criterion of extreme weightlifting is body burden with high level of effort. The aim of the study was knowledge about effect of the weight of the barbell on the behavior of some kinematic parameters recorded during the bench press by disabled powerlifters.

Material & Methods: Twenty-nine disabled weightlifters (23.9 ± 6.1 years) from Disabled Sport Association were examined. Each subject performed a bench press, respecting all rules and regulations, 4 times. The subjects lay supine on the powerlifting bench, afterwards they took the bar from the racks, lowered it down to the chest and pressed upwards till full extension of the elbows. Following loads were used: 40% 1RM, 60% 1RM, 80% 1RM and 95% 1RM (1RM—one repetition maximum). A potentiometer was used to register time of movement and distance. Empiric distribution of analyzed characteristics did not differ from normal distribution, what was evaluated with the Shapiro-Wilk test. Distribution comparison at different loads analysis were calculated with the t-test for dependent samples ($p < 0,05$). Spearman's rank correlation coefficient for parameters in upwards and downwards movement was calculated.

Results: Time, velocity and acceleration of downward movement towards the chest were similar for all loads in all examined athletes. During upward movement the time increased from the load 60% 1RM or more, whereas velocity and acceleration decreased with the bar load increase. Velocities were correlated in upward and downward movement, which means that the faster the athletes lowered the bar, the faster they also pressed it up. In 95% 1RM trial the maximal acceleration did not differ statistically significant. Correlations between maximal acceleration in upward and downward movement were significant up to 80% 1RM.

Conclusions: Bar load increase did not cause significant changes of kinematic parameters during downward movements, during upward movement the bar load influenced the parameters' changes significantly. The time of movement increased, while velocity and acceleration values decreased.

Electromyographic analysis of bench press in paralympic athletes

Author(s): Vasconcelos de Oliveira Borges, Costa de Sousa, Tafarel Pereira Rego, Maciel Vitor Medeiros, Arsenio Spina, Guilherme Araújo Tinoco Cabral and Moreira Silva Dantas

Year: 2014

Source: https://www.medicinasportiva.ro/SRoMS/english/Journal/No.40/Electromyographic_bench_press_paralympic_athletes.html

Abstract:

The aim of the study was to analyze the percentage of muscle activation by surface electromyography (sEMG) at different intensities in bench press execution, in the pectoralis major muscle, anterior deltoid, serratus anterior, biceps brachii and triceps brachii of paralympic weightlifters. Six male paralympic weightlifting athletes were evaluated, aged 32.7 ± 3.50 years, with a body mass of 78.3 ± 14.35 kg, during a national Weightlifting Circuit held in Natal/RN, Brazil. Two tests were performed: on Test 1, the athlete performed the bench press movement with 50% of the maximum load lifted on the competition. The test 2 was performed, with the lifting of the maximum load (100%). The analysis of variance (ANOVA) was used to evaluate the effect of the exercise performed. The pectoralis major muscle was more active in both tests and the only one showed a statistically significant difference, with percentage of activation 19.9 ± 3.19 on test 1 and 27.6 ± 2.91 on test 2. The percentage of activation muscles in test 1 and test 2, respectively, was Serratus anterior (16.9 ± 2.43 vs. 21.0 ± 6.83); Triceps brachii (16.3 ± 4.63 vs. 19.6 ± 4.93); Anterior deltoid (14.3 ± 6.24 vs. 20.2 ± 6.21) and biceps brachii (16.0 ± 5.18 vs. 17.3 ± 6.35) ($p < 0.05$). In conclusion, the percentage of activation in all muscles analyzed during the execution of the bench press was greater with increasing intensity, suggesting that training with heavier loads lead to a greater muscle activation in paralympic weightlifters.

An analysis of the barbell motion depending on its weight in disabled powerlifting

Author(s): Seidel and Zurowska

Year: 2014

Source: https://www.researchgate.net/publication/286863125_An_analysis_of_the_barbell_motionDepending_on_its_weight_in_disabled_powerlifting

Abstract:

Background: The aim of the study was to assess the symmetry of flexion and extension movements in upper limbs in disabled powerlifters during bench press with different barbell loads.

Material/Methods: 29 disabled athletes from the National Powerlifting Team were examined. Mean age was between 23.9 ± 6.1 . Mean sport experience was 5.4 ± 3.6 years.

Results: Both flexion and extension movement were performed symmetrically, which was indicated by an insignificant ($p < 0.05$) difference in the movement onset in the left and the right upper limb.

Conclusions: Time differences in the movement onset and the achievement of maximal angular velocity were statistically insignificant in all trials (loads from 40% to 95% 1RM). During extension with loads over 60% 1RM differences in time of achieving maximal angular velocity were statistically significant or close.

Evaluation of perception of quality of life of disabled athletes

Author(s): Bartosz and Tetyana

Year: 2014

Source: https://www.researchgate.net/publication/307833938_Evaluation_of_perception_of_quality_of_life_of_disabled_athletes

Abstract:

Purpose: To evaluate the perception of quality of life for athletes - disabled, participating in individual and team Paralympic sports.

Material: The study involved 32 athletes sports club "Start" in Wroclaw in 2013, engaged in individual sports: swimming, weightlifting, powerlifting (powerlifting) and command: wheelchair basketball and volleyball in a sitting position.

Results: Studies have proven that sports people with physical disabilities have a positive effect on the quality of their lives.

Conclusions: 1. Study aspects of perception of quality of life is a complex issue, but deserves proper attention and appropriate force to study it. 2. Athletes - Disabled involved both individual and team sports, the perception of quality of life is average.

Modified Wingate test for estimation of exercise capacity of Polish disabled weight-lifters

Author(s): Bolach and Jacewicz

Year: 2008

Source: https://www.researchgate.net/publication/246277666_Modified_Wingate_test_for_estimation_of_exercise_capacity_of_Polish_disabled_weight-lifters

Abstract:

The aim of this paper was to show the correlation between the parameters of the modified Wingate Test (TWB5/15) and the results of the most significant and prestigious weightlifting competitions for disabled – Championship of Poland and Europe. The research group consisted of four women and thirteen men – representatives of Polish National Paralympic Team of Weight-lifters. The mean age of this group was 33 years and average training experience – 14.7 years. The examined weight-lifters had various dysfunctions, which included amputations (6 competitors), locomotor system diseases (9 competitors) and cerebral palsy (2 competitors). The Anaerobic Capacity Test 5/15 (ACT 5/15), a modified version of the Wingate Test, consisted in lifting a weight lying on a level bench (in accordance to IPF regulations). Competitors performed a total of five series. Duration of each series was 15 seconds. The number of lifts in each series was recorded in the fifth and fifteenth second for the purpose of subsequent calculations. There were one minute breaks between the series for the subjects to rest and for taking measurements necessary to determine their training capacity. Duration of the testing series and breaks was measured with Spokey electronic stopwatch. During every break the weight was increase by 5 kg. Weights were changed four times throughout the time of the test. Analysis of the research data showed correlations between the parameters of ACT 5/15 and performance of the competitors. Correlations of these traits were usually stronger in the spring than in autumn. The mean values of all measured capacity parameters were higher in the spring 2006 and the change in performance correlated strongly with the changing of the capacity parameters.

Performance of disabled weight lifters vs. training service length

Author(s): Bolach and Wardęga

Year: 2008

Source: https://www.researchgate.net/publication/246277990_Performance_of_disabled_weight_lifters_vs_training_service_length

Abstract:

Polish disabled weight-lifters maintain a very high level of performance. This is a sports discipline that is becoming more and more popular among young disabled people, who want to work and compete with the able-bodied people. The aim of this study was determine correlations between the length of training service and the results of the Polish national team of disabled power-lifters in years 2004-2006, which were evaluated using the index of actual fitness developed by Haleczka. The research material consisted of a group of 29 power-lifters of the Polish national team of disabled power-lifters (5 women and 24 men). A strong and statistically significant correlation between the length of training and results was observed in lifters with relatively short service. This correlation declined along with the increase of the service length. In the group of men the correlations between the results and the service length were getting significantly lower than in women with every subsequent year of training. A strong, statistically significant positive correlation between length of training service and results was observed only among female power lifters.



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