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The Effect of Short-Set High-Load and Long-Set Low-Load Isometric Exercises Based on Stress-Strain Isometric Time-Dependent Strength Trial on Weightlifters Performing Resistance Training Periodization

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SUMMARY

Introduction. Isometric deload resistance training is both short set high load and long set low load, combining the implementation so-called "recovery" or "light" weeks to expose stress load strain energy generation, enabling to isometric load time set curve – indeed controversial and previously uncleared – on undulation, different set configuration and repetition zone working.

Objective. Our study aimed to investigate available stress-strain relationship on different set configuration "deload training regimes" in Olympic and professional weightlifters.

Materials and methods. Four Olympic and professional weightlifters (1 women and 3 men) were included, mean age: 21.50 ± 7.85 years, height: 1.68 ± 0.03 m, weight: 70.75 ± 13.69 kg, deload resistance training over 3 week and per week 2 days.

Results. Isometric modeling deload resistance training periodization was generated, stress load strain energy generation promoting low load *vs* high load repetition session into light weeks, different set configuration and rest interval. Each isometric resistance exercise session showed dynamic strength increased by undulation sets and repetition zone ranges, isolated isometric load time decreased by training volume change, and endurance localization increased by deload loading working principle on maximize performance.

Conclusions. Specific undulation short term periodization properly enhanced maximize performance of weightlifting resistance training athletes, in this case bi-weekly non-linear different set configuration can be supported to optimize stress load strain energy generation.

KEY WORDS

Deload resistance training; maximize performance; weightlifters; isometric load; low-high set.

INTRODUCTION

Current isometric stress load strain energy generation – controversial one of sustained-contraction strength training model – enable to maximum repetition strategy associated with load time set curve (1, 2). Generally, isometric loading condition is high sustained contraction to enhance periodic single *vs* multiple set session, intensity and rest interval, uncleared different resistance training periodization (2). Furthermore, isometric modeling deload resistance training previously unexplained on sustained contraction related to early and late isometric load time set curve performing maximize micro strength performance (3, 4). Periodic isometric load time set sessions form stress-strain energy generation by constant training hyperbola, with sustained early and late

contraction repetition session to adopt isometric resistance training properly periodization (1, 3, 5). In this resistance loading training, the shape performed maximum repetition zone, set change and isolated isometric load time on non-linearly bi-weekly periodization (4). Indeed, isometric modeling deload resistance training periodization linearly enhances low load and high load set configuration related to normal stress "σ1, σ2, σ3" load factors (2, 3). Isometric stress load therefore (1), one of resistance period is strain energy (ε) generation, able to one periodic single set session (2); however, strain energies gradually increase on sustained contraction force potential, while cleared isometric speed phase session (4). In this case, isometric early and late force development were demonstrated to perform load time set curve on dynamic strength, isolated isometric load time to load increase one set finish resistance training processes (3, 4). Commonly, isometric training period was explained on load time set curve accordingly, stress load strain energy generation completed on time under sustained and non-sustained contraction single set session (4). In this case, potential isometric strain force energy generation based load time set change as a constant training hyperbola ($Fx\varepsilon = \sigma/tE$), where "Fxε" is strain energy, "σ" is isolated load time stress, "tE" is time-dependent trial and totally "ΔE" so-called difference energy generation. Currently, isometric training period may be clarify isolated isometric load time on single set load session both at 90% of 1RM and 120% of 1RM time-dependent strength trials (4). However, dynamic strength reach was determined on maximum repetition zone working principle based on constant training volume equally endurance localization, both with 70% of 1RM and 75% of 1RM moderate load stress set configuration (4). High load set and low load set non-linearly bi-weekly periodization conduct stress-strain energy generation associated with different load time set curve and strategic deload strategy (3, 4). For this common resistance training hyperbola approach to weightlifters, stress-tension strength trials contribute to personal customization of training programs in multiple sets and low-high loads (5). In addition, isometric strain energy generally worked on high load stress used to high force potential production by self-selected time speed (4). Accordingly, isometric sustained contraction potential force phases progress load time set relationship on reaching high strength effort and variable strain force enhancement (6, 7). Therefore, isometric modeling deload resistance training regimes were including both low load high set or high load low set within light weeks and recovery weeks previously non-planned on short time resistance training periodization. Thus, this study aimed to deload training regimes enhance stress load strain energy generation by performing different set configuration, repetition zone range and rest interval in Olympic and professional weightlifters.

MATERIALS AND METHODS

The study formed on 2 Olympic and 2 professional weightlifters: 1 woman and 3 men included in mean age 21.50 ± 7.85 years, height 1.68 ± 0.03 m, weight 70.75 ± 13.69 kg, participated in isometric modeling deload resistance training periodization. Olympic and professional weightlifting resistance training woman and men had 6.50 ± 9.11 years of weightlifting and resistance training experience. We obtained the permission from Akdeniz University Clinic Ethic Committee Research Protocol (No: 2023/629 – date of approval: September 21, 2023).

Procedure

The isometric modeling deload resistance training regimes is one of the current weightlifting training performances preferred to short time to maximize micro strength performance over 3 week and 2 days per week, enabling to detect dynamic strength, isolated isometric load time and endurance localization.

Experimental conditions were respectively: 1) day dynamic strength, 2) day isolated isometric load time, 3) day endurance localization performed on sport area weightlifting room (in Turkey).

The experimental condition of isometric modeling deload resistance training periodization was conducted on loaded isom. jump squat on barbell free, bench press on bench machine, isom. deadlift on weightlifting rack platform and back squat on weightlifting rack platform – preferred to non-periodically maximum repetition zone range working, principle non-sustained day to day performance (**figure 1**).

The experimental procedure started on dynamic strength day performing with an initial load at 40% of 1RM (10 rep) warm-up to each training performance and test baseline session; then, gradually maximal strength sessions were applied at 70% of 1RM (5 rep) and 90% of 1RM (2 rep), by adding 10-20 kg load (Eleiko, Sweden and Werksan, Turkei). Then after, specific relative strength was used to body mass strength with load intensity calculator. After, their in isolated isometric load time day by load time-dependent strength trial was performed on high load at 80% of 1RM and 90% of 1RM isometric load 1 trial by using time calculator lab. Again, endurance localization (max. rep) was executed to high load training session detection by absolute local endurance at 70% of 1RM conducting maximum high repetition to one set finish.

After the experimental procedure, isometric modeling deload resistance training regimes were determined on 60%

Figure 1. Isometric model resistance exercises

(A) Loaded isom. jump squat; **(B)** Bench press; **(C)** Isom. deadlift; **(D)** Back squat.

of 1RM low load endurance zone volumes, 75% of 1RM moderate load hypertrophy zone volumes, and 90% of 1RM high load strength zone volumes completed weekly (**table I**). In this condition, total training volumes were provided on weekly deload resistance training regimes, changing detecting light or recovery weeks (8) (**figure 2**).

Statistical analysis

Primary analyses were resolved on pre-test and post-test comparisons using descriptive mean, standard deviation

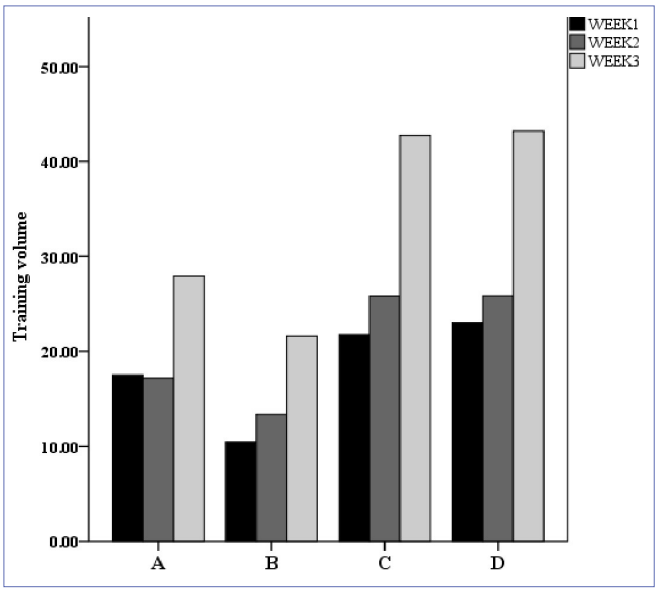

Figure 2. Training volume.

and confidence interval detection. Pre-test and post-test measurements were investigated in one paired-t test to weightlifters. Isometric modeling deload resistance training periodization outcomes were conducted on descriptor effect sizes: 0.00 < 0.20 - very weak, 0.20 < 0.50 - weak, 0.50 < 0.80 -strong, 0.80 < 1.20 - very strong, 2 or > 2 - extremely strong; alpha level was significant when $p < 0.05$ (9).

RESULTS

Isometric modeling deload resistance training outcomes resulted from non-sustained non-linearly daily zone and low-high load set configuration performance on total training volume for dynamic strength, isolated isometric load time and endurance localization (**figure 3**). Currently, maximize micro strength performance outcomes were concluded on dynamic strength for loaded isom. jump squat ($p = 0.038$; $t = -5.000$), bench press ($p = 0.000$; $t = -6.000$), isom. deadlift ($p = 0.073$; $t = -3.500$), back squat ($p = 0.300$; $t = -1.387$), endurance localization was resulted on 80% of 1RM for loaded isom.

Table I. Isometric modeling deload repetition resistance training periodization.

Endurance zone	Hypertrophy zone	Strength zone
60% 1RM	75% 1RM	90% 1RM
3 Set	4 Set	2 Set
15 Rep	8 Rep	5 Rep
3 min	1 min	3 min
1 week	2 weeks	3 weeks

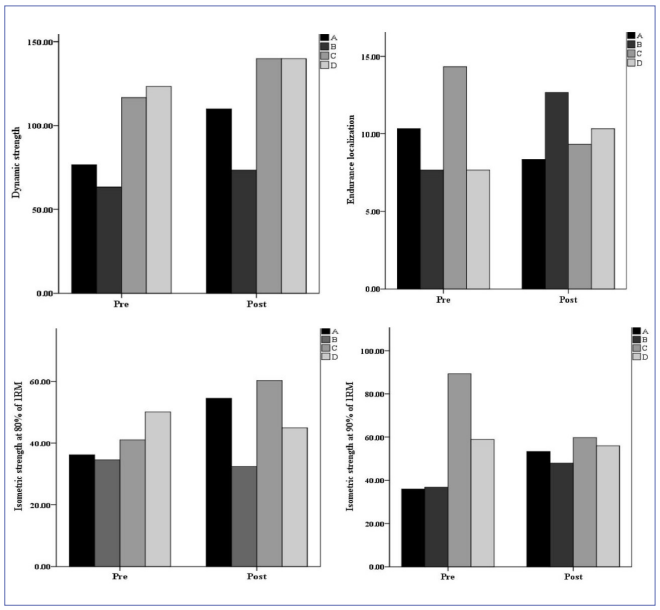

Figure 3. Maximize strength performance outcomes.

jump squat (p = 0.368; t = 1.555), bench press (p = 0.185; t = -1.987), isom. deadlift (p = 0.433; t = 0.974), back squat (p = 0.057; t = -4.000), and isometric strength at 80% of 1RM for loaded isom. jump squat (p = 0.183; t = -2.001), bench press (p = 0.790; t = 0.303), isom. deadlift (p = 0.142; t = -2.336), back squat (p = 0.149; t = 2.293), and 90% of 1RM was determined on loaded isom. jump squat (p = 0.026; t = -6.058), bench press (p = 0.032; t = -5.450), isom. deadlift (p = 0.174; t = 2.069), back squat (p = 0.739; t = 0.382) (**table II**).

DISCUSSION

Isometric modeling deload resistance training non-linearly light weeks periodization has been enhanced maximizing micro strength performance; additional short and high differently set configurations indeed were executed on load time set curve by performing deload repetition training regimes. Thus, low and high set non-linear bi-weekly short time recovery periodization to accurate maximum repetition zone working was explored on maximize micro strength perfor-

Table II. Maximize strength performance outcomes.

	Pre	Post	t	p	ES
Loaded isom jump squat (kg)	76.66 ± 25.16	110.00 ± 26.45	-5.000	0.038	1.29
Relative (kg/kg)	1.08 ± 0.26	1.55 ± 0.10	-5.198	0.035	2.38
70%-1RM (kg of rep)	10.33 ± 2.86	8.33 ± 1.52	1.155	0.368	Trival
80%-1RM (kg/t)	36.23 ± 11.53	54.51 ± 19.79	-2.001	0.183	Trival
90%-1RM (kg/t)	35.91 ± 14.46	53.31 ± 17.07	-6.058	0.026	1.09
Bench press (kg)	63.33 ± 32.14	73.50 ± 31.96	-6.000	0.000	0.31
Relative (kg/kg)	0.86 ± 0.23	1.01 ± 0.20	-7.852	0.016	0.69
70%-1RM (kg of rep)	7.66 ± 4.50	12.66 ± 6.80	-1.987	0.185	Trival
80%-1RM (kg/t)	34.54 ± 21.74	32.37 ± 9.44	0.303	0.790	Trival
90%-1RM (kg/t)	36.82 ± 16.66	47.97 ± 13.77	-5.450	0.032	0.72
Isom deadlift (kg)	116.66 ± 40.41	140.00 ± 43.58	-3.500	0.073	Trival
Relative (kg/kg)	1.63 ± 0.29	1.91 ± 0.17	-3.580	0.070	Trival
70%-1RM (kg of rep)	14.33 ± 10.06	9.33 ± 2.08	0.974	0.433	Trival
80%-1RM (kg/t)	41.10 ± 7.59	60.31 ± 21.55	-2.336	0.142	Trival
90%-1RM (kg/t)	89.32 ± 39.24	59.73 ± 25.39	2.069	0.174	Trival
Back squat (kg)	123.33 ± 41.63	140.00 ± 60.82	-1.387	0.300	Trival
Relative (kg/kg)	1.72 ± 0.23	1.92 ± 0.36	-1.554	0.260	Trival
70%-1RM (kg of rep)	7.66 ± 1.52	10.33 ± 0.57	-4.000	0.057	Trival
80%-1RM (kg/t)	50.12 ± 22.80	44.94 ± 23.22	2.293	0.149	Trival
90%-1RM (kg/t)	58.93 ± 45.18	55.93 ± 31.71	0.382	0.739	Trival

mance of weightlifters. Isometric modeling deload repetition resistance exercises are popular sustained contraction resistance training performance for one of repetition maximum method and available high load single set session achieved on high strength effort (10). Similar resistance training condition as traditionally low load back squat barbell training session was selected on 10-20% load lifting range one set session maximal strength effort, indeed normally load incremental set session condition may be planned hypertrophy zone and strength zone to long time high load non-linear periodization (11). In this case, maximum repetition zone periodic resistance training strategies are specific training volume planning at 80% of 1RM – 4 set on bench press 8% and squat 19% incremental intense for increase maximize micro strength effort (11). In other condition, endurance localization was determined on moderate load 70% of 1RM and 75% of 1RM to develop maximum repetition deload repetition increasing (4). In this case, endurance localization based maximal strength reach increase to high repetition maximum single set training period session within stress load strain energy factors (12, 13). Additionally, endurance localization zone ranges may be planned on low load 60% of 1RM, indeed military press 4% and bench press 8% were increased in long time periodization (12). However, optimize micro and macro strength performances were estimated both at low load 30% of 1RM and 60% of 1RM periodic deload sessions are similar for maximize strength performance (13). In contrast, resistance training incremental strength approach – so-called zone repetition range – was estimated one repetition loaded jump squat at low load 30% of 1RM and high load 80% of 1RM for detect maximal strength periodization (14). In this condition, the current study reported that resistance training high strength zone effort performed on 90% of 1RM by upper and lower body working (3, 4). Therefore, maximal speed-based strength reach to develop isometric time dependent strength trial resulted in constant strain time on high load 90% of 1RM and 120% of 1RM low repetition (1 s) and high load high repetition (3 s) isolated isometric load (4). This maximal strength phases were determined on sustained and non-sustained deload periodization to execute isolated isometric load time performance (4, 8). Therefore, stress load to deload planning was explained on dynamic strength phases, thus similar results may be other working repetition load maximal zone ranges (15). Isometric modeling deload repetition resistance training, one of resistance training regimes used to clarify maximum repetition zone working principle, based on load time set curve and different undulation set configuration to enhance stress load strain energy generation – both low and high load volume implementation. Thus, current study limited on light or recovery weeks of weightlifters.

Limitations

In this research, stress-strain time-dependent strength trials based on isometric exercises were carried out as a deload strategy in resistance training periodization. Limited to short-term load-reducing training regimes. In the study, the isometric method was performed with low load high set and high load low set, but the changing set configuration was limited to light weeks.

CONCLUSIONS

High effective isometric modeling deload resistance training periodization depends on isometric time-dependent strength trial performing reach to develop maximal micro strength performance. It is a periodic development strength detection. Indeed current resistance training periodization is load increase and time decrease performance related non-sustained contraction stress-strain potential energy generation. Specialized training methods need to be continued, as it supports optimized stress load strain energy formation under the influence of isometric deload resistance training, which improves short-term maximum performance in weightlifters, and supports short set high load and long set low load performances. Current stress load strain energy generation showed in short time periodization on light or recovery weeks of weightlifters, however, literature was uncleared about stress load development dependent on strain energy with load and time session, different set configuration and deload repetition loading zone performance on different sport modalities, athletic branches and coaches.

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None.

DATA AVAILABILITY

Data are available under reasonable request to the corresponding author.

CONTRIBUTIONS

The authors contributed equally to this work.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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