

EFFECT OF TRAINING FREQUENCY ON LUMBAR EXTENSION STRENGTH IN HERNIA-OPERATED

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INTRODUCTION

The objective of this study was to determine the effects of a lumbar extension exercise frequency on lumbar extension strength in patients of lumbar discectomy surgery.

METHODS

Forty male patients with traumatic slipped disc at lumbar levels (L4-S1) participated in this study as subjects (age: 41.1 ± 5.7 yrs; height: 174.0 ± 5.7 cm; weight: 76.0 ± 7.4 kg). After the discectomy operation, all patients had 6 weeks of rest time and underwent post-operative isometric test and isokinetic lumbar extension training program provided by MedX system (Ocala, FL). At the end of the rest period, all subjects started 12 weeks of the pre-training for lumbar extension exercise: twice per week with progressive isokinetic exercise. Each day of the isokinetic training consisted of two sets of 15-20 repetitions for each set. After completion of the pre-training, all subjects participated in 12-week follow-up training, which had same training protocols as those of the pre-training. Subjects were randomly stratified to one of four training groups that trained twice times per week (GROUP 2), once per week (GROUP 1), once every two weeks (GROUP 0.5), and no training (CONTROL). Before and after the follow-up training period, all subjects completed two isometric lumbar extension strength tests on separate days. For each test, maximum voluntary isometric lumbar extension strength was measured using a MedX lumbar extension machine at seven positions (72° , 60° , 48° , 36° , 24° , 12° , and 0° of the trunk angle). Analysis of variance (ANOVA) was performed with the between-subject factor of GROUP (4 levels) and the within-subject factors of PERIOD (2 levels). The critical value for significant difference was set at $p = .05$.

RESULTS AND DISCUSSION

On average, GROUP 2 and GROUP 1 showed 11.78% and 3.33% increases of isometric strength values over all angles, respectively, while GROUP 0.5 and CONTROL showed

8.24% and 14.38% decreases after the follow-up training (Fig. 1). These findings were supported by the two-way ANOVA which showed significant PERIOD effects for 0° ($F_{[1,36]} = 35.40$, $p < .001$), 12° ($F_{[1,36]} = 14.06$, $p < .01$), 24° ($F_{[1,36]} = 4.53$, $p < .05$), 36° ($F_{[1,36]} = 12.88$, $p < .01$), 48° ($F_{[1,36]} = 11.48$, $p < .01$), 60° ($F_{[1,36]} = 6.22$, $p < .05$) and 72° ($F_{[1,36]} = 4.64$, $p < .05$), and significant GROUP x PERIOD interactions for 0° ($F_{[3,36]} = 170.77$, $p < .001$), 12° ($F_{[3,36]} = 97.91$, $p < .001$), 24° ($F_{[3,36]} = 73.50$, $p < .001$), 36° ($F_{[3,36]} = 85.94$, $p < .001$), 48° ($F_{[3,36]} = 109.49$, $p < .001$), 60° ($F_{[3,36]} = 93.58$, $p < .001$) and 72° ($F_{[3,36]} = 85.88$, $p < .001$). Table 1 shows the isometric strength values in Nm for each angle condition.

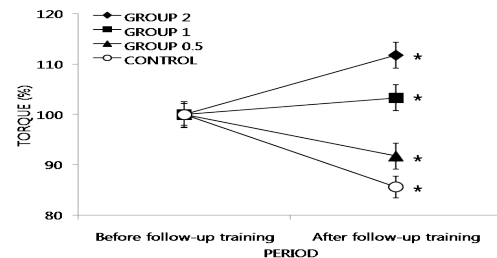


Fig 1: Isometric strength values (%) at mean angle in before and after the follow-up training. * $p < .001$

CONCLUSIONS

The results suggest that it is necessary to provide lumbar extension exercise for hernia-operated patients at least once a week and the training effects increase with two training sessions per week. This finding is not consistent with a previous study which showed no significant difference between one and two training sessions a week [1].

REFERENCES

1. Limke JC, et al., Eur J Phys Rehabil Med. 44(4):399-405, 2008.

Table 1: Isometric strength values (Nm) at seven different angles in before and after the follow-up training

	Angle (Degrees of Lumbar Flexion)						
	0°	12°	24°	36°	48°	60°	72°
GROUP 2 (n=10)							
Before follow-up training (Nm)	174.74±10.31	197.10±9.10	216.32±10.05	235.77±10.63	247.06±10.34	257.61±10.41	227.63±5.20
After follow-up training (Nm)	196.11±11.19	223.23±9.14	245.02±11.76	257.45±11.88	274.74±11.84	287.28±13.14	254.45±5.84
Rate of Increase (%)	+12.40	+13.56	+13.21	+9.15	+11.19	+11.34	+11.86
GROUP 1 (n=10)							
Before follow-up training (Nm)	168.53±13.01	196.35±11.31	215.99±11.04	226.11±10.98	236.52±11.60	245.99±11.62	221.08±5.44
After follow-up training (Nm)	172.10±13.93	203.63±10.73	223.79±11.28	237.04±12.14	243.77±12.23	252.96±11.79	228.45±5.61
Rate of Increase (%)	+1.84	+4.00	+3.73	+4.74	+3.02	+2.86	+3.34
GROUP 0.5 (n=10)							
Before follow-up training (Nm)	169.96±12.82	199.93±12.23	218.48±12.23	229.97±12.79	243.68±12.97	252.55±13.65	225.44±5.89
After follow-up training (Nm)	157.84±12.03	178.66±13.25	201.74±13.40	208.64±13.86	222.54±12.61	233.75±12.77	206.88±5.83
Rate of Increase (%)	-7.13	-11.20	-8.06	-9.72	-8.82	-7.46	-8.51
CONTROL (n=10)							
Before follow-up training (Nm)	177.93±7.12	196.65±10.32	216.58±10.83	232.38±10.66	249.29±10.39	257.05±10.55	227.94±5.17
After follow-up training (Nm)	143.54±7.99	164.31±8.33	183.31±8.93	201.64±9.36	218.13±9.11	225.08±10.30	195.15±4.95
Rate of Increase (%)	-19.75	-16.36	-15.28	-13.18	-12.46	-12.57	-14.73