

Effect of Focused Strength Training After Low Back Injury

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PURPOSE

Numerous approaches to the conservative treatment of patients with low back injury have developed in recent years. However, only one of these approaches utilizes focused strength training in which specific muscle groups are isolated as the patient participates in a conditioning regimen. The general efficacy of such an approach was studied in a research project which involved patients in the Orthomed program at University of California San Diego.

METHOD

Fifty-five patients (29 females and 26 males) participated in normal treatment sessions over an eight-week period. Treatment occurred on one 60-minute session two times each week. Each treatment session involved the use of the MedX Lumbar Extension machine and seven variable resistance exercise units, including leg extension, leg flexion, hip extension, hip flexion, lat pull-down, seated row, and overhead press. In addition, each patient underwent 10 to 20 minutes of cardiovascular conditioning using a bicycle ergometer, stairmaster, or exercise treadmill.

Pre-treatment and post-treatment measures were recorded for isometric back strength, lift capacity, pain ratings, self-perception, and activity level. Back strength was evaluated by the MedX Lumbar Extension machine,. Lift capacity was evaluated through the use of the EPIC Lift Capacity test. Pain was rated on a ten-point visual analog scale. Self-perception was evaluated by the Spinal Function Sort. Activity level was evaluated by the Oswestry Questionnaire.

RESULTS

BACK STRENGTH

A two-factor repeated measures analysis of variance which compared males and females in terms of the means of all three MedX tests ($n = 38$) found substantial improvement in back strength over the course of treatment ($F_{2,36} = 73.81, p = .0001$). The data for each sex at each time are presented below:

Group	Initial	4 weeks	8 weeks	Average
Female (n = 18)	69.38	97.31	114.88	93.86
Male (n = 20)	127.05	200.73	213.22	180.33
Totals (n = 38)	96.70	146.30	161.47	134.82

There was a significant interaction effect ($F_{2,36} = 10.08, p = .0001$). While all subjects improved significantly, disproportionately greater improvement was found early in the course of treatment. A repeated measures analysis of variance which compared the means of all three MedX tests ($n = 38$) across subjects categorized in terms of age found no significant difference attributable to age and no significant interaction effect.

LIFT CAPACITY

A two-factor repeated measures analysis of variance which investigated lift capacity on a gender basis found substantial improvement in lift capacity over the course of treatment ($F_{1,28} = 28.9, p = .0001$). The data for each sex at each time are presented below:

Group	Initial	8 weeks	Average
Female (n = 16)	23.46	29.64	26.55
Male (n = 14)	39.17	45.42	42.29
Totals (n = 30)	30.79	37.00	33.90

SELF-PERCEPTION

A repeated measures analysis of variance which investigated the effect of gender on rating of perceived capacity (RPC) found significant improvement ($F_{1,51} = 6.72, p = .01$). The data for each sex at each time are presented below:

Group	Initial	8 weeks	Average
Female (n = 27)	120.82	131.89	126.35
Male (n = 26)	138.73	152.08	145.40
Totals (n = 53)	129.60	141.79	135.70

PAIN RATING

A repeated measures analysis of variance which compared pain ratings of males and females found substantial improvement in pain over the course of treatment ($F_{1,48} = 31.16, p = .0001$). The data for each sex at each time are presented below:

Group	Initial	8 weeks	Average
Female (n = 26)	6.15	4.92	5.54
Male (n = 24)	5.48	3.65	4.56
Totals (n = 50)	5.83	4.31	5.07

These data indicate that subjects made substantial improvement in pain over the course of treatment and that there were no significant differences in terms of either the initial score, exit score, or degree of improvement between males and females.

ACTIVITY LEVEL

A two-factor repeated measures analysis of variance which compared male and female subjects in terms of initial Oswestry score and exit Oswestry score found significant improvement over the course of treatment ($F_{1,48} = 12.35, p = .001$). The data for each age group at each time of testing are presented below:

Group	Initial	8 weeks	Average
Female (n = 25)	13.92	11.80	12.86
Male (n = 24)	11.79	9.50	10.65
Totals (n = 49)	12.88	10.67	11.78

These data indicate that substantial improvement was found in the Oswestry score over the course of treatment and that there is no significant difference between males and females at each time of testing, nor is there a significant difference in terms of their response to treatment. A subsequent two-factor repeated measures analysis of variance found no significant difference in terms of age. There was not a significant interaction effect.

DISCUSSION

Focused training after low back injury appears to be an efficacious approach to treatment with broad effect. Not only were significant effects found with improvement in back strength, but these effects generalized to improvement in lifting capacity, self-perception, pain rating, and activity level. Additional research is underway to determine the effect of these clinical changes on return to work, medical recidivism, and other post-treatment issues.