EFFECTS OF TRAGER RELAXATION TECHNIQUE ON EMG ACTIVITY OF THE LOW BACK MUSCULATURE

A. Finch and N. Williams
Indiana State University, Terre Haute, IN USA

This study examined the direct EMG activity level of the erector spinae while recumbent after being administered a 1 hour Trager body treatment or 1 hour of rest.

METHODOLOGY

Ten healthy college-age males were administered either a resting treatment or a Trager body work treatment. The resting treatment consisted of lying on a padded bench in a dimly lighted room for 68 minutes with EMG recordings of the longissimus muscle taken every 4 minutes. The Trager body work consisted of a series of body part manipulations involving waggles, stretching, and manual massage applied systematically to the neck, right foot, right leg, left foot, left leg, abdomen, left arm, right arm, chest, left leg, right leg, right shoulder, back, left shoulder, and low back for a total treatment duration of 1 hour.

Standard electromyographic (EMG) techniques were used to record the direct EMG activity of the right longissimus (at lumbar 2 level) by a Sensormedics R611 dynograph recorder using a bipolar electrode configuration. A 3 second interval of the direct EMG activity of the right longissimus was recorded at a paper speed of 25 mm/sec prior to any treatment and then subsequently after each body part was manipulated. The EMG signal was filtered using a 100 Hz frequency cut-off and the pre-amp and pre-amp multiplier were adjusted to provide a reasonably sized amplitude that was not clipped. The electromyograms were examined and a typical 3 second interval (75 mm) was selected for analysis and the zero baseline was marked. The horizontal axis of the electromyogram was aligned, the tracing was affixed such that the horizontal axis was parallel to the numonics digitizer, and every discrete positive peak pen deflection was digitized. This process measured and recorded the amplitude in millivolts of each muscle action potential indicated by the pen deflection. Computer software tabulated the number of impulse spikes during the 3 second interval, calculated the pulse/sec frequency, and then calculated the average electrical activity of the EMG peaks.

RESULTS AND DISCUSSION

An ANOVA (2 x 17, treatment by body part/time) with repeated measures on both

factors was used to analyze the erector spinae EMG data. The ANOVA and subsequent post hoc analyses revealed that the Trager body treatment(s) significantly reduced the motor unit pulse frequency of the longissimus ($p<.009$). The analysis revealed an impulse frequency of 28.1 ± 16.1 pulses/sec for the neck at the beginning of rest and concluded with a pulse frequency of 34.8 ± 15.6 pulses/sec after 1 hour of rest. The analysis showed a pulse frequency of 30.5 ± 10.8 pulses/sec being reduced to 22.8 ± 3.5 pulses/sec after 1 hour of Trager body work treatment (see Table 1 and Figure 1). The increase in the pulse frequency during the resting session was probably due to the impatient personalities demonstrated by the subjects which was indicated on a Spielberger State-Trait Test (1970). The lowering of the frequency rate during the Trager treatment would indicate that the Trager body manipulations/stretching would be an effective method of reducing the excitation level of an individual leading to greater relaxation (Jacobson, 1936; deVries, Burke, Hooper, & Sloan, 1976; Morgan & Horstman, 1976; deVries, 1961; Moore & Hutton, 1980).

TABLE 1. EMG pulse frequency and average peak EMG activity of erector spinae during rest and alter a Trager treatment.

	Rest		Trager	
Body Part	Frequency pulse/sec	Mean EMG mv	Frequency pulse/sec	Mean EMG mv
Supine				
Rest	28.1 ± 16.1	.004 ± .002	30.5 ± 10.8	.006 ± .001
Neck	27.6 ± 14.5	.007 ± .004	26.9 ± 6.6	.005 ± .001
R Foot	33.1 ± 13.6	.010 ± .006	26.2 ± 7.6	.005 ± .001
R Leg	36.8 ± 16.3	.003 ± .002	23.0 ± 7.6	.005 ± .002
L Foot	34.2 ± 15.8	.003 ± .001	23.3 ± 3.7	.006 ± .002
L Leg	29.2 ± 11.6	.002 ± .001	23.9 ± 5.7	.005 ± .001
Abd	32.3 ± 16.2	.003 ± .001	24.9 ± 5.9	.001 ± .001
L Arm	31.3 ± 19.4	.004 ± .002	21.0 ± 3.3	.005 ± .001
R Arm	31.4 ± 16.6	.003 ± .002	23.7 ± 2.1	.006 ± .002
Chest	32.8 ± 18.5	.003 ± .001	21.5 ± 4.4	.005 ± .002
Prone				
L Leg2	32.9 ± 14.3	.003 ± .002	21.3 ± 2.4	.005 ± .002
R Leg2	33.9 ± 19.1	.003 ± .002	23.0 ± 4.8	.005 ± .002
R Shoulder	34.5 ± 15.8	.003 ± .003	21.2 ± 2.5	.005 ± .002
Back	36.6 ± 18.7	.004 ± .003	22.1 ± 4.6	.005 ± .002
L Shoulder	36.3 ± 16.4	.002 ± .001	22.9 ± 4.6	.005 ± .002
Low Back	34.6 ± 13.9	.002 ± .002	22.8 ± 6.2	.003 ± .001
Supine				
Neck 2	34.8 ± 15.6	.003 ± .002	22.8 ± 3.5	.005 ± .003

The average of the EMG peak activity of the erector spinae was 0.00401 ± 0.00222 millivolts before rest and 0.00257 ± 0.00164 millivolts after 1 hour of rest (see Table 1 and Figure 2). This resulted in a significant reduction ($p<.0007$) in the mean peak direct EMG activity of the longissimus muscle during the rest period. The initial Trager mean peak EMG activity was 0.00552 ± 0.00130 millivolts and the mean peak EMG activity after 1 hour of Trager manipulations was 0.00479 ± 0.00259 millivolts ($p<.0007$). This would indicate that the Trager treatment had a tranquilizing effect on the low back musculature electrical activity and corresponding muscle tension.

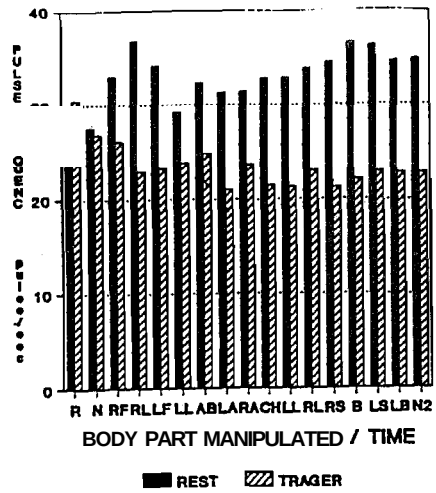

Figure 1. Pulse frequency of erector spinae after Trager treatment or rest.

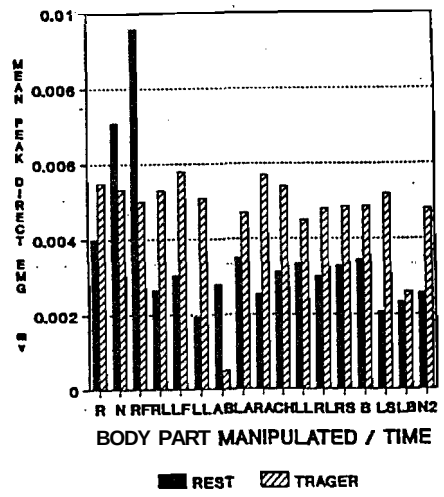

Figure 2. Mean peak direct EMG of erector spinae after Trager treatment *or* rest.

CONCLUSIONS

The ability of this body work treatment to reduce the electrical activity of the low back and corresponding muscle tension may indicate that the Trager body work may be a potential intervention treatment to reduce stress in an individual and the associated physiological implications related to physical stressors.

In summary, the Trager body treatment significantly reduced the EMG activity of the erector spinae as evidenced by a reduction in the EMG peak activity and the EMG impulse frequency.

REFERENCES

deVries, H. (1961). Electromygraphic observations of the effects of stretching upon muscular distress. *Research Quarterly, 32*,468-79.

deVries, H., Burke, R., Hopper, R., & Sloan, J. (1976). Relationship of resting EMG level to total body metabolism with reference to the origing of "tissue noise." *American* Journal of *Physical Medicine,* 55.13947.

Jacobson, E. (1936). The course of relaxation of muscles of athletes. *American Journal of Psychology, 48*,98-108.

Moore, M. & Hutton, R. (1980). Electromygraphic investigation of muscle stretching techniques. *Medicine and Science in Sports and Exercise, 12*,(5), 322-329.

Morgan, W. & Horstman, D. (1976). Anxiety reduction following acute physical activity. *Medicine and Science in Sport (Abstract),* 8.62.

Spielberger, C., Gorsuch, R., & Lushene, R. (1970). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA.: Consulting Psychologists Press.