30

Effects of Flotation REST on Range of Motion, Grip Strength and Pain in Rheumatoid Arthritics

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Rheumatoid arthritis (RA) is a chronic, progressive inflammatory disease of unknown etiology. It is a leading cause of long term disability with approximately 60% of the patients becoming disabled within 10 years (Whisler & Rothsmich, 1985). This disease, which commonly shows onset in the 20-55 age range, involves a systemic inflammation of the synovial membranes of joints as well as joint capsules, tendons, and tendon sheaths (O'Sullivan, Cullen, & Schmitz, 1981). It appears that the synovial membrane undergoes a local autoimmune response causing increased vascular permeability and collection of cellular blood elements. The infiltration causes the synovial membrane to become thickened and multicellular. As the disease progresses, chronic synovitis develops and destruction of cartilage and subchondral bone occurs.

The RA patient demonstrates a variety of physical symptoms, including inflammation, redness, and local heat at the joints. These symptoms are associated with pain, decreased range of motion, and decreased strength, especially in the hands. Traditional treatment for arthritis symptoms is moist heat in the form of hot packs, paraffin, and

warm whirlpools (Moll, 1983). Moist heat decreases joint stiffness and muscle spasms as well as decreasing pain. Hydrotherapy has reportedly been beneficial in the management of RA symptoms. Tindall (1976) stated that patients exhibiting decreased range of motion and pain benefitted from pool therapy. It has been hypothesized that these benefits accrue from muscle relaxation associated with warm water and decreased strain of gravity associated with buoyancy.

There is evidence that various physiological and psychological stresses can exacerbate RA symptoms (Gordon, 1985). Thus, relaxation training may be beneficial for individuals with RA. Hypothetically, relaxation training involving moist heat should provide maximum relief from RA symptoms. One relaxation modality utilizing moist heat in a relaxing environment is flotation Restricted Environmental Stimulation Therapy (REST) in which the patient floats supinely in a light-free, minimal sound chamber which contains a saturated epsom salts solution maintained at 34.5° C. Preliminary research has shown that the use of flotation REST (henceforth, REST) is associated with decreased aspirin intake and decreased subjective pain reports in rheumatoid arthritis patients (Mereday, Lehman, & Borrie, 1988).

The present study was undertaken to determine the effects of REST on specific symptoms of RA. The study was intended to determine within and across session effects of REST on range of arm motion, grip strength and reported pain.

Materials and Methods

Four subjects previously diagnosed as having Stage II RA with moderate symptoms but otherwise in good health participated in this study. Subjects ranged from 52 to 69 years in age. Daily use of acetylsalicylic acid was <2 g. Two different REST environments were used in the study. The first, REST-Wet consisted of an ovid fiberglass chamber (Floatarium, Inc., Huntington, New York), 2.5 x 1.3 x 1.1 m, filled to 25 cm. depth with a saturated epsom salt ($MgSO_4$) solution having an approximate specific gravity of 1.28 and temperature

maintained at 34.5 ± 0.3° C. The chamber was light-free and the sound level inside was <30db, with further attenuation due to submergence of the ears in the solution. The second environment, labelled REST-Dry, was a rectangular chamber similar in dimensions and conditions to REST-Wet with the exception that a pliable plastic polymer membrane separated the supinely floating subject from the buoyant fluid (Relaxation Dynamics, Inc., Boulder, Colorado).

Parameters

The physical parameters measured were the Range of Motion (ROM in degrees) of left and right shoulders and wrists and the grip strength (GS in Kg. force) of the hands. ROM was measured using a goniometer and GS was measured using a hand dynamometer. Subjective pain (SP) was assessed via the McGill Pain Questionnaire.

Protocol A

Two of the subjects experienced two REST-Wet sessions per week (three days apart) for five weeks, with each session lasting 45 minutes. ROM, GS, and SP were determined before and after sessions 1, 2, 9, and 10. For each session the procedure consisted of the following sequence: SP, ROM, GS measures, brief shower; REST; brief shower; SP, ROM, GS measures.

Protocol B

The remaining two subjects experienced biweekly (three days apart) REST-Wet sessions for two weeks followed by one week without sessions and then biweekly (three days apart) REST-Dry sessions for two weeks. Session length, within session procedure and parameters measured were identical to the first protocol. Pre- and post-measurements were taken in the first and last REST-Wet and in the

first and last REST-Dry sessions.

Results

Protocol A

Each ROM value reported is based on the average of all ROM measurements taken at a given time, i.e., left shoulder and wrist and right shoulder and wrist. Initial shoulder ROM averaged for all subjects and conditions was 168° of 190° possible, and wrist ROM was 62° of 90° possible. Each GS value reported is based on left and right hand average. Initial GS averaged for all subjects and conditions was 10.3 Kg force.

Data from sessions 1 and 2 were pooled and data from Sessions 9 and 10 were pooled. ROM and GS data were normalized as percentages of the presession averaged for the initial two sessions. These percentages for ROM were be calculated as:

$$\frac{\text{complete ROM - initial observed ROM}}{\text{complete ROM - subsequent observed ROM}} \times 100$$

where complete ROM = 270°, i.e., complete shoulder (180°) and complete wrist (90°). These percentages for GS were calculated as (GS subsequent/GS initial) X 100. SP is reported as values ranging from 0 to 10 on a pain rating scale where 0 is no pain and 10 is extreme pain.

Both subjects showed increased ROM and GS and decreased SP within sessions and across sessions (see Figure 30-1). ROM and GS increased 15.4% and 16.8%, respectively, within sessions in the initial sessions. A pre-post increase of 8.8% for ROM and 21.2% for GS was observed in the final sessions. Reported pain decreased 57.4% within sessions in the initial sessions and decreased 15.5% within sessions in the final sessions. Across session changes were determined as average percent change from presession value for initial sessions to presession value for final sessions. ROM and GS increased 35.2% and 40.9%, respectively, across sessions, while SP decreased 53.0%.

Protocol B

Data processing and analysis was similar to Protocol A with the exception that the initial (baseline) values were based on session 1 only,

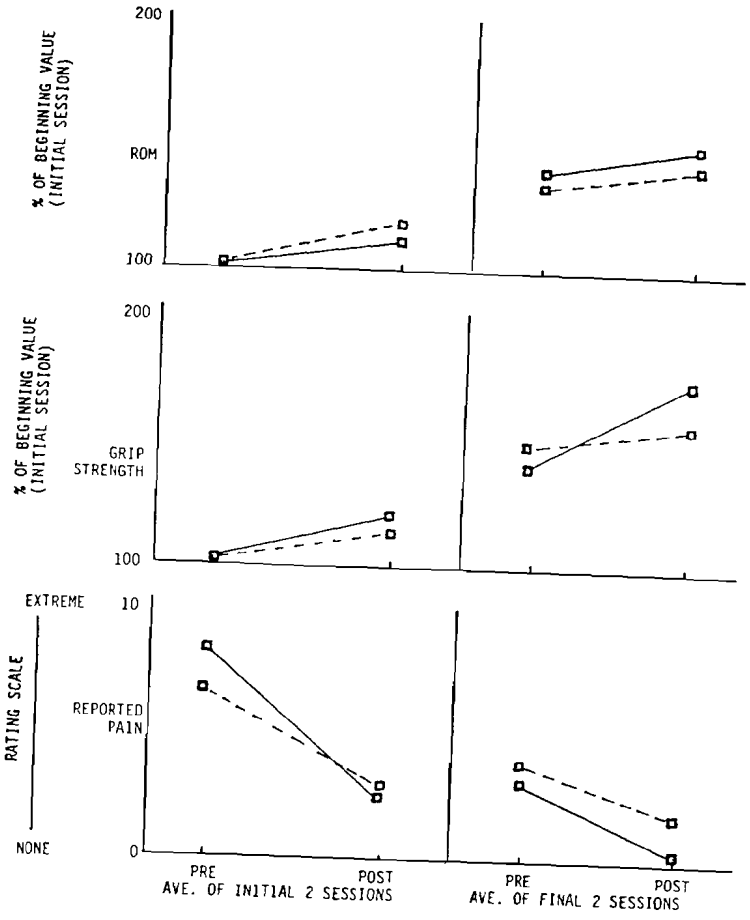

Figure 30-1. Within and across-session effects of brief; repeated REST-Wet on symptoms of rheumatoid arthritis. ROM = range of motion (mean for left and right at shoulder, forearm and wrist), GS = grip strength (mean for left and right), RP = reported pain from McGill Pain Questionnaire.

in REST-Wet and in REST-Dry. In the initial session of REST-Wet (see Figure 30-2) both subjects showed moderate within session increases in ROM (average 13.7% increase) and GS (average 18.5% decrease) and marked decreases in RP (average 67.5%). The within session pattern was similar in REST-Wet final sessions, but the response was not as great (see Figure 30-3). In REST-Dry ROM and

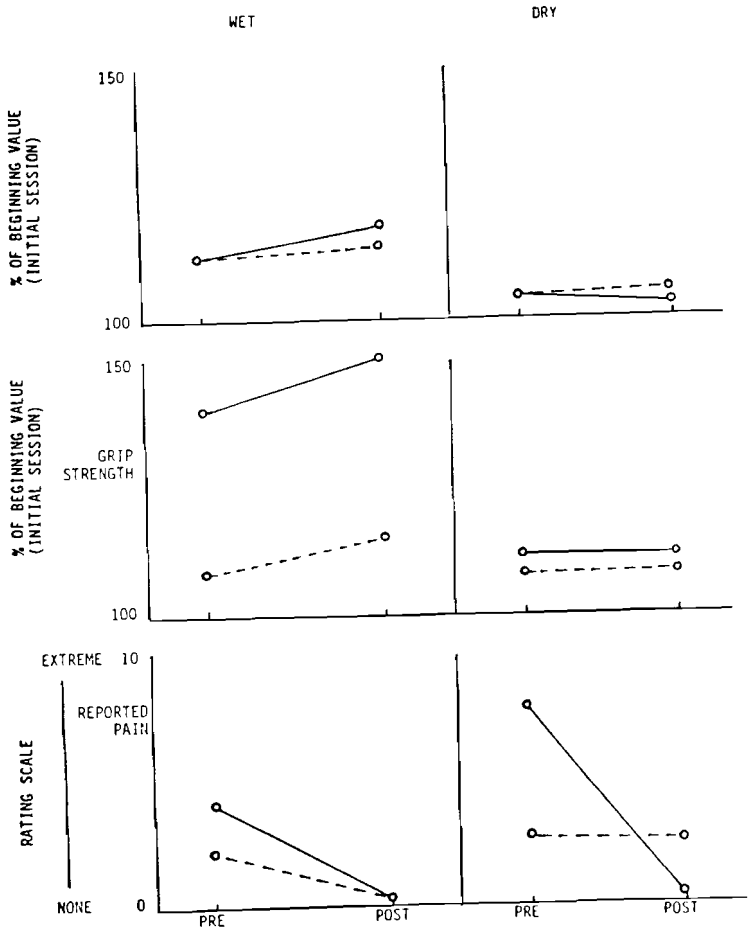

Figure 30-2. Session 1 results, Protocol B

GS increased 5.8% and 9.5%, respectively, and SP decreased 69.1% within initial sessions. With the exception of a 66.7% decrease in RP in one subject, no within session change was observed in final sessions.

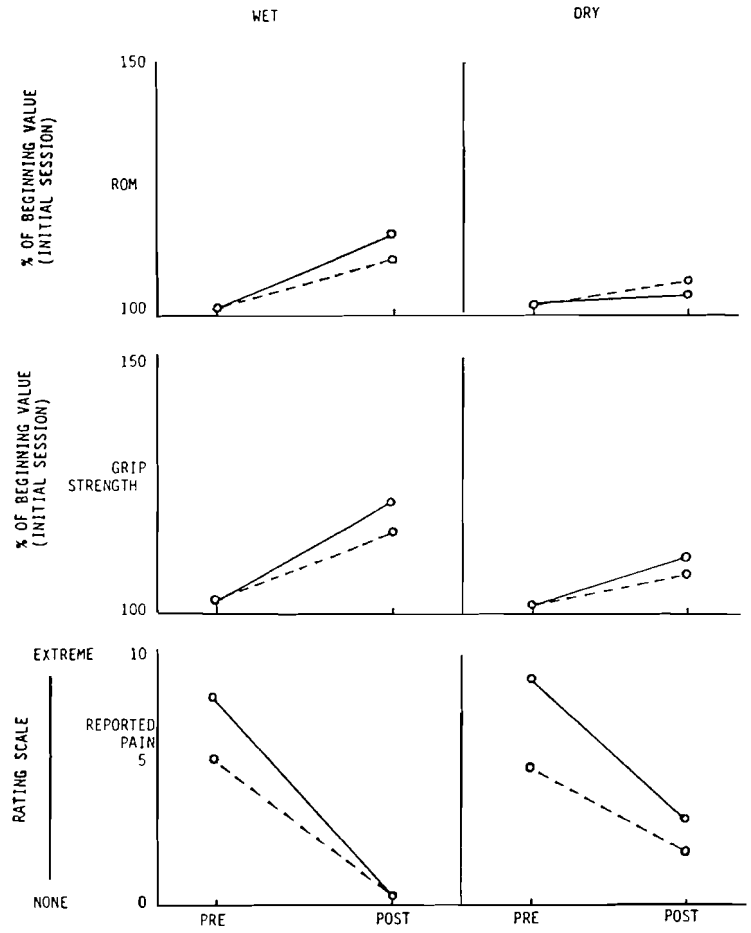

Figure 30-3. Within session effects of brief, repeated REST-Wet or REST-Dry on symptoms of rheumatoid arthritis: a) mean of initial two sessions and b) mean of final two sessions. ROM = range of motion (mean for left and right at shoulder, forearm and wrist), GS = grip strength (mean for left and right), RP = reported pain from McGill Pain Questionnaire.

Both subjects showed across-session increases in ROM and GS and decreases in SP in both REST-Wet and REST-Dry, with responses being 32-55% as great in REST-Dry as in REST-Wet (see Table 30-1).

Discussion

REST-Wet was consistently associated with improved ROM and GS and decreased pain both within and across sessions in all subjects, with all but one subject reporting no pain post session in several instances. Responses in REST-Dry were generally less consistent and less vigorous than in REST-Wet, both within and across sessions. The reasons for this are not known. Several factors may have been contributory. A major difference between the two conditions was the absence of contact with

Table 30-1

Effect of Brief, Repeated REST-Wet or REST-Dry on Symptoms of Rheumatoid Arthritis

Parameter	Across-Sessions Change (%)		
	REST-Wet across 4 sessions	REST-Wet across 8 sessions	REST-Dry across 4 sessions
Range of Motion	↑ 12.8	↑ 35.2	↑ 4.1
Grip Strength	↑ 24.5	↑ 40.9	↑ 10.7
Reported Pain	↓ 39.6	↓ 53.00	↓ 22.5

the fluid in REST-Dry. Since RA symptoms are reportedly relieved by moist heat, the presence of moisture and humidity in REST-Wet may have been more beneficial. However, the membrane in REST-Dry is also associated with differences in degree of auditory stimulation (ears are not submerged), temperature, kinesthesis, and spatial orientation. In other words REST-Wet and REST-Dry provide quite different experiences, making it impossible to attribute the difference in response to any single factor.

Another possible basis for the less vigorous responses in REST-Dry may be the protocol sequence. The REST-Wet sessions were experienced before the REST-Dry session by both subjects. Thus, it was possible that a significant portion of the total response was already achieved in REST-Wet, limiting the further response to REST-Dry. Alternatively, part of the vigor of the REST-Wet response may have been an "expectation" or placebo effect, exaggerating the difference between Wet and Dry. It seems unlikely that the former possibility was true, since the actual starting values for the parameters measured were similar for REST-Wet and REST-Dry. This fact would also suggest that there was little long-term carryover effect of the four REST-Wet sessions. This may be due to the small number of sessions, since studies using a larger number of REST-Wet sessions demonstrated significant carryover of across-session changes in blood pressure (Fine & Turner, 1982) and plasma cortisol (Turner & Fine, 1991) in some subjects. In this regard, both subjects experiencing eight REST-Wet sessions subjectively reported pain relief for 24-48 hours after a given session. However, even short-term (session to session) carryover seemed limited in the present study for ROM and GS, since the starting values for each REST-Wet session were usually closer to the previous pre-session value than to the post-session value.

The placebo issue cannot be resolved in the context of the present study, since there was no control condition. However, within session improvements continued to occur throughout the REST-Wet protocols in all four subjects, regardless of the number of sessions. Studies of placebo effects in biobehavioral treatment of hypertension have indicated that such effects show regression toward the mean after two or three sessions (Weiner, 1979). This would suggest that in the present

study the placebo effect, if present, was not a major contributor to the outcome.

Despite the small number of subjects in this study, the responses in REST-Wet were substantial and consistent both within and among the parameters measured. The results suggest that the possible use of REST in the treatment of RA symptoms deserves further investigation.

Acknowledgment

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