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## Can Total Motion Release Increase Shoulder Range of Motion in Collegiate Swimmers?

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**Objective:** The purpose of this study was to assess if the intervention of two or six motions of Total Motion Release (TMR) will affect the internal range of motion (IROM) and external range of motion (EROM) of the shoulder on swimmers at an NCAA Division III private college. TMR is a unique technique that identifies and treats imbalances in the body. Pain and dysfunction in one area of the body may be affected by movements that take place elsewhere. Identifying these imbalances can help alleviate the problems by performing the treatment on the side of ease. The fundamental six motions of TMR are; arm raise, bent arm wall push, trunk twist, single-leg sit-to-stand, leg raise, and weight-bearing toe reach. While the two motions are only trunk twist and arm raise.

**Design and Setting:** The design for the study was an experimental randomized three-group pretest-posttest experiment. The independent variable in the study were the 29 collegiate swimmers at one NCAA Division III private college. These participants were randomly divided into three groups: a control group, an experimental group with two motions of Total Motion Release (TMR<sub>2</sub>), and another experimental group of the six motions of Total Motion Release (TMR<sub>6</sub>). A pretest measurement was taken on each of the participants' shoulder IROM and EROM of the dominant and nondominant arm. Shoulder IROM and EROM are the dependent variables in this study. Each participant completed the fundamental six motions of TMR to determine which two motions had the greatest difference between each side and indicate which was the side of ease. Once that was determined, an intervention was completed

based on which group the participant was in. The participant was then measured immediately after the intervention and then again one-week post intervention in the same way for the pretest measurement. All interventions and measurements were taken in an NCAA Division III athletic training clinic.

**Participants:** A convenience sample of collegiate swimmers (N=29) were recruited for the study. Nine (n=9) were randomly placed into the control group, five (n=5) were females while four (n=4) were males. Nine (n=9) were in the experimental TMR<sub>2</sub> group, including five (n=5) females and four (n=4) males. Eleven (n=11) were in the other experimental group of TMR<sub>6</sub>, comprising of six (n=6) females and five (n=5) males.

**Intervention:** The research project was approved through an Expedited Review with the Wilmington College Institutional Review Board. A pilot study was conducted before the collection of data to show that the measurements were reliable. The measurements were shown to be reliable based on the results of the Pearson Correlation of .674 for IROM and .909 for EROM. My measurements were tested against a certified Athletic Trainer of eight years. The participants of this study received one of three interventions; no intervention, TMR<sub>2</sub>, or the intervention of TMR<sub>6</sub>. All three groups were taken through the six fundamental motions. Participants in TMR<sub>2</sub> only treated the two motions of trunk twist and arm raise consisting of three sets of thirty seconds of static holds of each motion to the side of ease. The participants in TMR<sub>6</sub> used the findings from the top two ranked motions with the greatest difference between the

two sides to determine what two motions the participant will be completing. The motions of arm raise, trunk twist, and leg raise completed a static hold three sets for thirty seconds to the side of ease. While the motions including bent arm wall push, single-leg sit-to-stand, and weight-bearing toe reach completed three sets of fifteen to the side of ease. SPSS 21.0 was used to calculate the results using a mixed ANOVA. The alpha level was set *a priori* at .05.

**Main Outcome Measurement:** A goniometer was used to measure shoulder IROM and EROM of the dominant and nondominant arm.

**Results:** In the TMR<sub>2</sub> group, the averages of IROM of the dominant arm were pre intervention 38°, post intervention 48° and one-week post intervention was 47°. This indicated after the intervention was completed there was an average of 10° increase of IROM of the dominant arm. For IROM of the nondominant arm, the averages of the measurements were pre intervention 46°, post intervention 60.5°, and one-week post intervention 62.5°, showing an average of 14.5° increase of IROM of the nondominant arm from pre intervention to post intervention. The averages for EROM of the dominant arm were pre intervention 99.5°, post intervention 102°, and one-week post intervention 101°. While the averages for EROM of the nondominant arm were pre intervention 89.5°, post intervention 96.5° and one-week post intervention 100.5°. This shows there was a slight increase of range of motion of the dominant arm after the intervention and about 7° increase of the non-dominant arm. Only two of the nine participants in the TMR<sub>2</sub> group (trunk twist and arm raise) identified that the arm raise had the greatest difference between the two sides, while no participants indicated the trunk twist was one of the top two motions that had the greatest difference. With these results, one can conclude that there could have been even more of an increase of IROM and EROM if they actually completed the two motions that had the greatest differences between the two sides. In the TMR<sub>6</sub> group 7 of the 11 participants indicated that the trunk twist and the bent leg toe reach were the top two motions with the greatest difference from each side. This is different from the previous experimental group as 0 of the 9 participants

indicated the trunk twist intervention was needed. For TMR<sub>6</sub> there was a difference from pre intervention 71° to post intervention 82.5° of EROM of the dominant arm. There was an 11.5° increase range of motion. These results were very interesting as the TMR<sub>2</sub> group who did not choose the top two motions based on their greatest difference actually had more of an increase in both ranges of motion of the dominant and nondominant arm while the TMR<sub>6</sub> group only had EROM of the dominant arm increase despite the participants identifying the two motions that needed the intervention. In the control group, each participant went through the six motions to identify what were the top two motions with the greatest difference between the two sides. This group did not actually complete the treatment of the static holds or repetitions of the motion. It was found that after the participants in this group completed the motion, but not the treatment, the range of motion actually decreased from pretest to posttest. For IROM of the dominant arm the pretest measurement was 47.5° while posttest was 43°. For the non-dominant arm, it was 41.5° pretest and 42.5° posttest. For EROM of the dominant arm there was a 5° decrease after the test while there was an 11.5° decrease in the nondominant arm. The assumptions for a mixed ANOVA were not met, so appropriate square root statistical transformations allowed the analysis of data; with the exception of EROM nondominant. There were not statistically significant findings for EROM dominant between the three groups ( $p=.498$ ) with a mean of  $1.8\pm.09$ . There were statistically significant findings for IROM of the dominant arm [ $F(4,52)=3.790$ ,  $p=.009$ , partial  $\eta^2=.226$ ] between all three groups, post intervention [ $F(2,26)=6.626$ ,  $p=.005$  partial  $\eta^2=.338$ ] with a mean of  $1.6\pm 0.9$  and one-week post intervention [ $F(2,26)=3.684$ ,  $p=.039$ , partial  $\eta^2=.221$ ] with a mean of  $1.6\pm.07$ . There were statistically significant findings for IROM nondominant [ $F(3,121,40.567)=4.651$ ,  $p=.006$ , partial  $\eta^2=.236$ ], post intervention [ $F(2,26)=4.109$ ,  $p=.028$ , partial  $\eta^2=.240$ ] with a mean of  $1.6\pm 0.9$  and one-week post intervention [ $F(2,26)=4.662$ ,  $p=.019$ , partial  $\eta^2=.264$ ] with a mean of  $1.70\pm.08$ . **Conclusions:** This study supported Total Motion Release as a technique

that can be used by Athletic Trainers with collegiate swimmers to increase their IROM and EROM of the dominant and non-dominant arm. TMR<sub>2</sub> (arm raise and trunk twist) had the most impact by having a significant increase in IROM of both the dominant and nondominant arm while only increasing EROM of the dominant arm. TMR<sub>6</sub> only significantly increased EROM of the dominant arm. These results were similar to

those previously reported in the literature. The control group had a decrease in EROM and IROM once completing the six motions but not receiving the treatment (static holds or repetitions of motion). Due to the violation of assumptions further testing needs to be conducted.

**Key words:** Total Motion Release, TMR<sub>2</sub>, TMR<sub>6</sub>, internal rotation, external rotation, collegiate swimmers, shoulder range of motion