

The Role of Human Cartilage Oligomeric Matrix Protein Concentration during Closed Kinematic Chain Exercises and Physiological Cyclic Loading in Joint Degeneration

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ABSTRACT

While studies have recommended open kinematic chain exercises which impose minimal shock load in arthritic joints to prevent further cartilage degeneration, others have shown closed kinematic chain exercises beneficial among healthy individuals by significantly increasing serum human cartilage oligomeric matrix protein (hCOMP) concentration which augments cartilage turnover and diminishes after cartilage degeneration. Objective: To determine the effect of physiological cyclic loading and closed kinematic chain exercises in individuals with varying body mass on their levels of hCOMP. Methodology: This study measured blood serum hCOMP concentrations before and after intervention. Blood samples (5mL) were drawn from 45 healthy male adults before and after intervention and were properly labeled with its assigned code. All subjects were randomly distributed to 3 groups with 15 subjects each. Group A performed closed kinematic chain exercises for 30 minutes, group B did physiological cyclic loading for 30 minutes, and group C just sat (control). The blood samples were centrifuged for 10 minutes to separate the serum under 4°C and stored in a freezer at -20°C until analysis using the AVIVA SYSTEMS BIOLOGY® COMP ELISA Kit (Human) (OKBB00457) for the quantitative measurement of Human COMP in blood serum through a microplate reader at absorbance Optical Density 450 pg/mL. Results: There was a significant difference ($p \leq 0.05$) in the pre and post-intervention serum hCOMP concentration within each group [A (t 1.786293, p 0.04786), B (t -2.754006, p 0.007761), C (t -4.164479, p 0.000555)]; and among the three groups [F(2, 41) = 50.00015, p 1.88]. Post hoc comparison (Tukey HSD test) indicated that groups A (0.7143+0.0804), B (0.491+0.135) and C, control (0.2045+0.1807) were significantly different from each other. However, there was no significant relationship between the BMI and post-intervention blood serum hCOMP concentration within groups A (R2 0.152, p 0.151839), B (R2 0.0306, p 0.532748) and C (R2 0.0301, p 0.552828). BMI and post-intervention blood serum hCOMP concentration within groups revealed no significant relationship (linear regression); however, the trendline slope pattern showed an inversely proportional relationship that as the BMI increased the serum hCOMP level decreased. Conclusion: Closed kinematic chain exercise and physiological cyclic loading can increase hCOMP thereby facilitating cartilage turnover which may prevent cartilage joint degeneration. However, an increasing BMI can lead to a decrease in hCOMP.