## ABSTRACT

### Forces Acting on the Patellofemoral Joint with Closed Chain Exercises

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**Purpose**

The purpose of this study was to answer two questions by reviewing the literature relevant to them: (1) what biomechanical forces affect the patellofemoral joint during closed chain exercise; and (2) can a clear set of guidelines be synthesized for closed chain exercise in the rehabilitation of the patellofemoral joint.

**Methodology**

The research design for this study was an inductive analysis of the literature that addressed the forces exerted on the patellofemoral joint during closed chain exercises and the literature that addressed guidelines for rehabilititation of the patellofemoral joint. This inductive analysis was facilitated by primary, secondary, and tertiary questions that pertained to these two topics.

Sources of data included the database of the National Library of Medicine, PubMed, the Cumulative index to Nursing and Allied Health Literature, and the reference lists from the 1999 Ola Grimsby Institute residency curriculum and the seminar notes from the 1998 Cinncinnati Sports Medicine "Advances in the Knee and Shoulder" conference. Kinds of data included editorials, opinion and theoretical articles, literature reviews, and empirical studies.

Data analysis involved allocating articles found through the literature search to the questions that they fit best, composing synopses of these articles that featured the information needed in order to answer the questions, making notes on the synopses that pertained to the questions, plus synthesizing the information in the notes and composing an answer to each question.

**Findings**

Regarding the factors contributing to patellofemoral stress, three categories were induced: (1) cartilage properties; (2) motor recruitment/torque issues; and (3) alignment variables. Two factors were induced that are important determinants in range of motion guidelines in closed chain exercise: (1) the location of patellofemoral lesions; and (2) the influence of flexion angle on motor recruitment.

## Conclusions

While there was agreement on the forces creating patellofemoral stress, the literature was not consistent on the best ways to minimize this stress. Further, while the literature included guidelines for the rehabilitation of the patellofemoral joint, these guidelines were also inconsistent with each other. Thus, recommendations for further research include topics that address both these inconsistencies and gaps in the literature pertaining to such issues as the material properties of articular cartilage in combination with articular geometry and closed chain geometry in the deeper ranges of flexion.