



A Range of Motion Conditioning Program for Junior Tennis

Kibler, W.B. and Chandler, T.J.
Lexington Clinic Sports Medicine Center, Lexington KY

This research was funded by the USTA Sport Science and Medicine Research Grant (1996)



INTRODUCTION

- Changes in range of motion (ROM) in one's joints and muscle flexibility are thought to significantly affect risk of injury in athletes. This issue is especially relevant for players participating in repetitive-use sports such as tennis.
- Although the exact causes and effects of the relationship between ROM/flexibility and injury are not known, decreased motion at certain joints are generally considered to be maladaptive. In fact, recent research suggests that decreased motion and muscle inflexibility creates movement changes and predisposes players to further and more serious injury at the tissue and cellular levels.
- This project sought to create an injury prevention program designed to address these issues by emphasizing the identification and correction of maladaptive conditions such as deficits in ROM and flexibility so that risk of serious injuries associated with these conditions can be reduced in junior tennis players.

PURPOSE

The purpose of this study was to determine the effectiveness of a conditioning program designed to address range of motion (ROM) in competitive male and female junior tennis players.

SAMPLE

Fifty-one tennis players, 29 males (average age of 13.6 years) and 22 females (average age of 13.2 years), participated in the study.

METHOD

- These players took part in a conditioning program consisting of standard physical therapy flexibility exercises using the stretch, hold, and release technique.
- To ensure proper exercise execution, the exercises were first taught to the participants in person and then later provided through demonstrations on a videotape of the exercise routine.
- Along with changes in players' ROM, the degree to which players complied with the training program was measured through exercise logs and reports from the players and their parents.

YEAR PERFORMED 1996

WHAT DID THE STUDY FIND?

- Results indicated improvement in almost all ROM measures after one year of training.
 - However, little further improvement was observed in the second year of the program.
- It was determined that these positive changes in ROM were related to the conditioning program as opposed to other factors such as age, gender, skill level, and amount of time playing tennis.
- When compared to players who did not participate in the conditioning program, participants showed increases in several ROM measures including (but not limited to) the sit and reach test, inward shoulder rotation of the dominant and non-dominant arms, gastrocnemius (the action which extends the foot and bends the knee) of the non-dominant leg, and outward hip rotation of the dominant and non-dominant legs.
- Except for forearm supination (rotation inward, toward the body), there were no differences in ROM changes between high complying versus low complying players.
- The areas that showed the greatest improvement with training were in the shoulder and back, which are areas at most risk for injury in tennis players.
- In conclusion, joint ROM can be positively influenced with a specific conditioning program.



COACHING IMPLICATIONS

- The study confirmed that range of motion (ROM) deficits can be found in tennis players at young ages and consistently across athletes.
 - Also, without intervention, these conditions can become worse with time and continued participation.
- This study also demonstrated that ROM and flexibility can be enhanced with a specific conditioning program based on a sport specific evaluation of the sport and an evaluation of each individual player.
- It appears that the conditioning program has its greatest effects during the first year of implementation. After that point, the prior improvement can be maintained (with further participation in the program) in the face of continued play.
- Recommendations are that players perform the flexibility exercises 4 to 5 times per week to correct inflexibilities.
- Thereafter, the exercises should be continued on a maintenance level 2 to 3 times per week.
 - The following are examples of the program exercises:
 - Toe-touch (standing or seated)
 - Cross body stretch
 - Shoulder external rotation
 - Shoulder internal rotation
 - Pretzel stretch
- It is especially important that athletes who play tennis intensely, and who are at greater risk for developing maladaptions in ROM and flexibility, are encouraged to include these exercises in their training program. This is true for players with or without clinical symptoms of related injuries.
- To improve adherence to the conditioning program, the frequency of the exercises should be reasonable, the exercises should be safe, and the exercises should be easy to learn and to perform.

REFERENCES / RESOURCES

- Cahill, B. (1993). *Intensive participation in children's sports*. In B.R. Cahill & A.J. Pearl (Eds.), American Orthopedic Society for Sports Medicine. Champaign, IL: Human Kinetic.
- Chandler, T.J., Kibler, W.B., Uhl, T.L., Wooten, B., Kiser, A. & Stone, E. (1990). Flexibility comparisons of junior elite tennis players to other athletes. *The American Journal of Sports Medicine*, 18(2), 134-136.
- Kibler, W.B., Chandler, T.J., Uhl, T. & Maddux, R.E. (1989). A musculoskeletal approach to the preparticipation physical examination, preventing injury and improving performance. *The American Journal of Sports Medicine*, 17(4), 525-531.
- Lieber, R.L. & Friden, J. (1993). Muscle damage is not a function of muscle force, but active muscle strain. *Journal of Applied Physiology*, 74(2), 520-526.