



How Fit are World Class Tennis Players?

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INTRODUCTION

- Although singles tennis has been shown to have an aerobic conditioning effect, it is not considered an exemplary aerobic activity.
- Tennis promotes leanness only when it is combined with a healthy and nutritious diet. This sport also increases muscle strength and endurance unevenly and does not improve flexibility. Thus, tennis alone does not promote complete fitness development.
- This project examined the fitness level of elite tennis players who were competing in the 1988 GTE Hard-court Championships to determine the fitness of athletes at this level of the game.
- Special attention was also paid to the measures that are considered essential for, or predictive of, world class performance in the sport of tennis.

PURPOSE

- The purpose of this study was to document general fitness measures of world class tennis players including:
 - flexibility
 - body composition,
 - strength,
 - endurance, etc.
- Additionally, skill-related fitness measures were assessed in an attempt to find predictors of world class tennis performance..

SAMPLE

- Participants for this study were male tennis players with an average age of 24 years and average world ranking of 180.
- The number of players that participated in each portion of the study varied because not all players were willing or had the time to do the complete series of assessments



METHOD

The fitness measures that were assessed were:

- flexibility
- percentage of body fat
- cardiorespiratory endurance,
- muscular strength
- muscle endurance
- cholesterol
- power
- agility
- speed using tests such as the sit-and-reach test
- skin fold assessment
- timed push-ups and sit-ups
- grip test
- vertical jump and the
- 20-yard dash.



RESULTS

- Overall, the results of this study indicated that playing tennis, even at the elite level, does not provide complete fitness.
- Eight players completed an injury and training history questionnaire with the following results:
 - Six of the eight players had serious sport-related injuries in the past.
 - Most of these injuries had affected the shoulder, knee, and/or ankle.
 - Seven players stretched either daily or before each match, with only two athletes stretching all major muscle groups.
 - Six of the eight players reported they did aerobic conditioning such as jogging and cycling.
 - Six players said they did strength training consisting of Nautilus, free weights, push-ups and sit-ups.
- Results of the sit-ups and push-ups were within the normal range of the general population.
- Average body fat of the players who participated in this assessment was 6.9%, which is considered lean for 24 year old males (normal college-aged males range from 10.8 to 18.7%).
- The cardiorespiratory endurance test (step-test) results showed an average post-exercise heart rate of 44 beats per minute, which is considered above average.
- Average cholesterol was 159 mg/dL, well under the current recommended limit of 180 mg/dL.
- Tests results for speed (20 yard dash), agility (hexagon test), and power (vertical jump) were in the average range.
- Flexibility of the lower back was found to be 0.5, which is below the average value of the general population.
- Flexibility (range of motion) of the shoulder and wrists were also less than average for the general population.
 - In all cases the flexibility of the dominant side of the body exhibited less flexibility than the non-dominant side.
- The average flexibility (range of motion) of the hips was within normal limits except for hip internal rotation.
- Average grip strength of the players' dominant arms was 48.3 kg which resulted in 63.2% grip strength to body weight ratio.
 - More specifically, five of the six players tested exhibited the recommended grip strength to body weight ratios that are greater than 55%.
- Overall, the measures of shoulder also showed sufficient strength in this area; however, the average strength of the hamstrings and quadriceps of the players tested was found to be below recommended levels.

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RECOMMENDATIONS

- Cardiorespiratory endurance of the athletes studied was found to be just slightly above average. Most of the players had little knowledge of aerobic conditioning and did not exercise aerobically on a routine basis. Since improved aerobic capacity decreases fatigue, training to increase this capacity should lengthen optimal performance on the court as well as minimize injuries that tend to occur more frequently late in the matches or late in the season.
- Several components of the athletes' flexibility were found to be below average.
 - This deficiency is thought to be due to microtrauma to areas such as the shoulder due to overuse that is irritated by further use. This injury creates scar tissue in the involved muscles, which prohibits the player from exhibiting a full range of motion at the joint.
 - Therefore, it is important that proper protection and rehabilitation of injured areas be carried out to ensure full range of motion necessary for optimal play.
 - Decreased flexibility may also be due to improper and insufficient stretching techniques (that was often exhibited by the players in this study). Players should be encouraged to practice a stretching routine that incorporates all major muscle groups.
- While grip and shoulder strength of the majority of the players was found to be sufficient for their level of play, strength of the quadriceps and hamstrings was found to be low in several of the assessments.
 - It is advised that a regular conditioning program of these two muscle groups be incorporated into the training of players at all levels of the game. This type of program would not only help with strength and power for tennis play, but would also decrease lower extremity injuries.
- Cholesterol and percentages of body fat were low. Unfortunately, it was impossible to determine if training for tennis or genetic endowment was the primary cause for these findings.
- Because of the small number of players who were tested, tennis-specific tests of fitness could not be determined to be predictors of performance.

CONCLUSION

- Again, the results of this project lead us to believe that even tennis at the highest level of the game does not provide complete fitness. This study highlights the need for additional cardiovascular, flexibility, and strength training in tennis specific areas to maximize performance and reduce injury.