

LONGTERM BIOMECHANICAL PERFORMANCE DIAGNOSTICS WITH THE GERMAN NATIONAL GYMNASTICS TEAM

Mauno Nissinen

Olympic Training Centre Frankfurt-Rhein-Main, Frankfurt, Germany

KEY WORDS: gymnastics, performance diagnostics.

INTRODUCTION: Scientific research in gymnastics has become a vital part of high level coaching. The systematic biomechanical performance diagnostics with the German national gymnastics team started in 1978. Several investigations were conducted in training and competitive situations. After the foundation of the Olympic Training Centre in Frankfurt (1986) greater emphasis has been placed on direct application of research results. A new comprehensive project for the 2008 Olympic Games will be conducted by German Sport University.

METHOD: One of goals of the scientific institutes of sport is to develop objective measurement systems which could be used for diagnostic purposes as well as a training aid in daily practice. Emphasis on dynamic movements performed with generally larger amplitudes have replaced the earlier emphasis of the static-strength type of movements. Consequently, the number of injuries has increased. Therefore, evaluation methods that analyze the forces and force patterns as produced during gymnastic performances were developed for high bar, rings and vaulting. The contact and flight times during jumping and running activities can be determined by using sensitive contact mats. In the past it has been usual for the athlete personally to invent a new technique, or to modify and improve existing techniques. Today the computer simulation is a very useful tool to find out if the new movements are realistic or not. Individual segmental moments of inertia, segmental mass distribution, and location of segmental mass centers were obtained by a body scanner.

RESULTS: The results of the kinetic and kinematic analyses helped to improve the technical aspects of gymnastic performances. The objective information improved the quality of training. The results of these analyses can be used to design better and safer equipment. The longterm biomechanical performance diagnostics helped younger gymnasts qualify earlier into the national team

DISCUSSION: In recent years gymnastics has shown a rapid increase in the development of technical and physical performances. The average age of elite male and female gymnasts has continually decreased, while the intensity and extent of the training has increased. It should be emphasised that the time allocated to training in gymnastics can only be slightly increased. Therefore the quality of training is of utmost importance to the future gymnast.

CONCLUSION: To obtain the best results and the fastest feedback to coaches and gymnasts, biomechanical analysis equipment should be permanently installed at regular training sites. The systematic performance diagnostics should be started already in the very beginning of gymnastics career.

REFERENCES:

Brüggemann, G.P. et al. Geräteoptimierung im Kunstturnen aus der Sicht der Biomechanik, 100-113, 1982