



Kinesiology and Biomechanics Enhancing Performances

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IN sports, fitness of the sportsperson is paramount. Fitness involves a coordinated movement of bones, muscles and joints. Kinesiology is the field of science that studies which bones, muscles and joints are involved in a particular activity, what is the degree (magnitude/intensity) and sequence of involvement.

Biomechanics, on the other hand, deals with the principles and methods of mechanics applied to the study of the structure and function of biological systems. The biomechanics of the basic structure and function of humans and animals have been investigated from the microscopic to the macroscopic level. Sports biomechanics deals with the study of internal and external forces and their result.

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and to avoid stress or extra (unwanted) load. Such studies also help to devise ways and means of increasing the economy of the movements of bones, joints and muscles.

Biomechanics and Kinesiology help find solutions to several problems like:

- What type of training should be used?
- How to improve training?
- Technical improvement (effectiveness and efficiency in the movement).
- Management prevention, protection and rehabilitation of sports injuries, etc.

Fundamental to the study of human motion is measurement of the displacement of the body and its segments i.e. kinematic analysis as most popular and adopted methodology. Traditionally, cinematographic analysis of relatively high speed films has been the technique



Source: www.wikipedia.com

used to obtain kinematic data. However, the raw displacement data contain inherent errors. For this reason, various methods of smoothing the displacement data have been employed – the two most successful being digital filtering and the use of spline functions.

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Methods of three-dimensional cinematographic analysis were employed during the 1970s to improve the accuracy of studying complex human motions. Optoelectronic devices have also been used to acquire displacement data. Among the new techniques are polarised light goniometry; automatic image analysis in which a television image is scanned by computer to determine 'X', 'Y' and/or Z coordinates and finally different kinematic variables may be computed to provide the necessary analysis numerically and/or graphically for clinical research and teaching/coaching purposes; and light spot position measurement, which uses optoelectronic devices such as the SELSPOT. Accuracy in the measurement of external forces between the ground and the foot improved during the 1970s due to advances in force platform equipment and methodology.

Recent developments include a method of analysing the centre of pressure location in conjunction with horizontal and vertical components of ground reaction. While kinematic and kinetic analyses permit the explanation of the dynamics of human motion, researchers are interested in solving specific problems

in human mechanics, such as determining how a given sporting skill or movement can be improved by modeling, computer simulation, optimisation and other statistical approaches to motion analysis. Use of a computer is essential to the efficient implementation of these methods.

In sports, knowledge of biomechanics helps to realise or understand the underlying principle of efficient structure of a competitive sports performance and also helps bring about improvement in motor qualities. Based on knowledge of biomechanics, athletes can themselves evaluate their fitness and performance. It also helps the sportspersons evolve and understand new rules, regulations and skills of games/sports, facilities, etc. They would also be aware of the mechanical advantages and or disadvantages in human locomotion/movement.

For coaches too, knowledge of biomechanics comes in handy while deciding which player would be suitable for and would be expected to do better in which sports, what sort of training methodology and equipment/facilities would be required to train a sportsperson and will also help in prevention, protection and rehabilitation of sports injuries.

A thorough understanding of Kinesiology goes a long way in providing the future physical education teachers/coaches with the knowledge necessary for analysing human motion, and applying such analysis to the learning and improvement of motor skills. With applied anatomic background, the knowledge of Kinesiology helps to prevent injuries. Besides, economy and effectiveness of movement can be ensured. Kinesiology also has great significance in clinical/rehabilitation purposes. For designing and teaching of exercise/conditioning/fundamental movements the knowledge of kinesiology is must.

For sportspersons too, self-realisation about own performance is best realised by the athlete themselves with a background of kinesiology. They will be better suited to discover and recognise the underlying principles of movements and evaluate the kinds of exercises from the point of view of their effect on their body structure.

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