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Biomechanics of Sport

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Abstract:
Biomechanics has become a well-developed area of research within a number of discipline concerened with human motion. Pioneering work in physical rehabilitation, anatomy, aerospace science, automobile safety, industrial engineering(human factors) and biomedicine has greatly expanded our knowledge of human biomechanics. Within the field of sports and physical education, however, biomechanics has progressed slowly and today remains relatively underdeveloped. Biomechanicss is the scienfic role of the body and kinesiology is the study of the mechanic of the anatomy of the human muscle. boimechanics is the scientific study of the role of mechanics in biological system and kinesiology is the study of the mechanics and anatomy of human muscle. Study of the mechanical laws relating to the movement or structure of living organisms.

Introduction

During the early 1970s. The international community adopted the terms Bio- Mechanics to describe the application of mechanical principles in the study of living organisms. As it was realized after 1950 that the mechanical principles involving on the human body is entirely different from other things.

Internal forces takes place under the effect of external forces eg. When we walk.A background of mechanics can help coaches to know their sport more, make them more confident about their practice and extent their knowledge beyond the technique to know the scientific reason.

Kinesiology

"It is a field of study based upon the anatomical and mechanical analysis of human motion".

Meaning of Bio-mechanic

When the study of mechanics is limited to living structure, especially the human body, it is called Bio-mechanics.

The Bio-mechanics has derived from two words-

Bio means, something pertaining to living being or life.

Mechanics -means, the discipline which studies the movement of object/motion of objects with the help of mechanical principles.

Mechanics is a branch of physics which study the object/ from mechanical point of view. So, the knowledge of Bio-mechanics used to study and analysis the movement of living things. Any object is moving, it depends upon the resultant of various forces acting on the body.

MECHANICS

"It is that branch of physics concern with the effect that forces have on bodies and the motion produced by these forces".

BIO-MECHANICS

"Science concerned with the internal and external forces acting on a human body and the effects produced by these forces".

KINESIOLOGY is the scientific study of human motion. The words kinesiology is taken by the combination of two Greek words "Kinesis" meaning movement or motion "Logos" meaning word of knowledge or "the science of". It means Kinesiology is the science of motion.

Kinesiology is the science which investigates and analyses human motion (i.e. It is the science of human motion).

It is the study of scientific principles of movement in learning motor performance.

It concerns with:

a. Muscular area
b. Skeletal or anatomical area
c. Identification of type of lever in action

Aims and objectives of Kinesiology:

The aim of kinesiology is an understanding of this human machine and its processes of motor functions.

Objectives:

a. Improvement of body structure
b. Efficient use of body.
c. Successful participation in physical education
d. Maintain efficient and beautiful body.
e. Recognition of awkward and unwanted movement.
f. Its background applied in teaching methods and techniques in physical education.
g. Selection and evaluation of exercises.
h. Acquiring proficiency in motor skills.

Scope of Kinesiology:

We may distinguish three divisions within the discipline of kinesiology.

a. Structural and functional kinesiology dealing with the interrelation between the form and function of the body.
b. Exercise physiology or the correlation between kinesiology and basic sciences such as physiology and bio-chemistry.
c. Biomechanics, the investigation of human movement by means of the concepts of classical physics and their derivatives in the practical arts of engineering.

Sources of Kinesiology:

The study of human body as a machine for the performance of work has its basic foundation in three major areas of knowledge namely, Mechanics, Anatomy and Physiology more specifically Biomechanics, Musculoskeletal anatomy and neuromuscular Physiology.

1. Contribution of Biomechanics:

Biomechanics is the science which examines the internal and external forces acting on the human body and the effects produced by those forces.

The laws of physics are related to fundamental techniques employed in the various sports activities.

The knowledge of application of various mechanical principles of gravity, buoyancy, equilibrium, motion, leverage, force, angle of rebound, spin and projectile will provide efficient movements and perfection in performance.

2. Contribution of Musculoskeletal Anatomy:

   Anatomy describes the science of structures of the body. To use a machine efficiently it is necessary to know the way it is made, its structure, the material of which the parts are composed and the way they are put together.

   Anatomy helps a student to know the structure, locomotion and movement of the skeletal muscles. It helps to know the relationship of function to structure the physical abilities of skeletal and the movement of various joints.

3. Contribution of Neuro-muscular Physiology:

   The movement depend upon muscular contraction and contraction of muscles depend upon nervous circulatory, respiratory, digestive and excretion syatem. The proper knowledge of physiology principles will help to the students of kinesiology for teaching human motion more efficiently.

Role of Kinesiology in Physical Education and Sports:

1. To analyze motor skills and improving perfecting the performance in motor skills.
2. To provide the future physical education teachers, coaches with the knowledge necessary for analyzing human motion.
3. Selection and evaluation of conditioning exercises.
4. Analysis of activities helps for better and easier teaching.
5. Helps for deducting and correction the faults for effective performance by avoiding unwanted action.
6. Brings efficiency in movements.
7. Helps to prevent injuries.
8. Self-realization about own performance.
9. To discover and recognize the underlying principles and movement.
10. It helps to change or modify the techniques in relation to equipments and facities.
11. Evaluation of exercise and activity from the point of view of their effect on the human structure.
12. For physiotherapy, physical medicine purpose.
13. Restore the lost function of muscles and muscles reduction.
14. Selection of exercises based on individual needs.

Why Kinesiological Analysis?

1. An aid to effective teaching of skills.
2. Kinesiological knowledge enable teacher to diagnose any difficulties of each students performance with an "X ray eye"
3. Make aware type of injuries occurs in particular motor skills, and suggestion for prevention
4. Identification of categories.

Bio-mechanics is applied at all level of training and at all age.

Fundamental Skill

- **Basic fundamental Skill** – Which are develop from the childhood through the incoming years and which have the objective of meeting the daily life activity or which essential for daily life activity. Such as running jumping lifting carrying walking etc.
- **Sports Skill** – These are the constituent of a particular sports which are named as techniques as a sports like the fundamental skill of Basketball-dribbling shooting, passes etc.
  Each game composed of various skill and combination of these skill give rise to tactics. Basic movement ensure efficiency of General movement pattern. If a person have mastery over the skill is more of that person.
- Basic movement ensure efficiency of General Movement Pattern. If a person have mastery over basic movement than the chances of mastery over the skill is more of that person.
- Basic movements are to be developed in the initial stage of age – 10-15 stall learning is to be started.
- It is the duty of PT to develop Basic skill movement so as to develop the required co-ordination, posture etc. e.g. Walking style - Once the movement automat zed it is diff to change. Thus the PT correct the fault in basic movement in initial stage of age sport skill are having nature of complex demand high co-ordination speed, flexibility- Acquired as folder

3) Electronic digitizing devices – It can be interface directly.

Conclusion: Kinesiology is not studied merely to incite our interest in a fascinating and mysterious subject. It has a useful purpose. We study kinesiology to improve performance by learning how to analyze the movements of the human body and to discover their underlying principles. The study of kinesiology is an essential part of the educational experience of students of physical education, dance, sport, and physical medicine. Knowledge of kinesiology has a threefold purpose for practitioners in any of these fields.

There is a great deal of overlap, but in terms of learning one or the other, they each have a different educational basis. Generally, kinesiology is based on a strong biology/anatomy/physiology/medicine background while biomechanics is based on a strong math/engineering background. Biomechanics is more quantitative in nature while kinesiology focuses more on application.

The first means the study of the mechanics of the body while the second means the study of application of mechanical laws to living organisms and bodies. Thus the main relation is that the both undergo a symbiotic relationship between biology and movement.

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