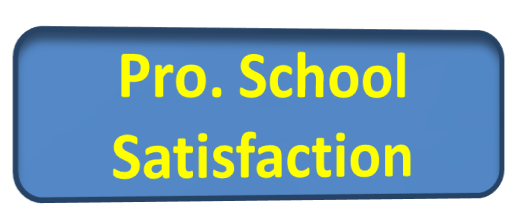
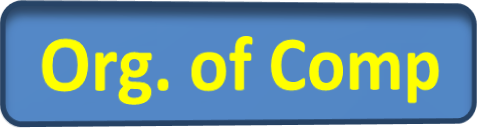
#### Sports Training: An Introduction

* ***Training:*** *the process of preparation for some task.*
* ***Sports Training:*** *It is the idea that a structured system of training can be established that incorporates training activities that target specific physiological, Psychological, and Performance Characteristics of individual sports and athletes.*
* *It is a process by which an athlete is prepared for the highest level of performance possible.*
* ***Training:*** *Increase the athletes skill and work capacity to optimize athletics performance.*

#### Sports Training: An Introduction

**Training:** It is the process to development of specific attributes correlated with the execution of Various tasks.;

* + *These various attributes Includes;*
    - *Multilateral Physical Development*
    - *Sports Specific Physical Development*
    - *Technical Skills*
    - *Tactical Abilities*
    - *Psychological Characteristics*
    - *Health Maintenance*
    - *Injury Resistance*
    - *Theoretical Knowledge*



#### Definition of Sports Training

***According to Martin (1979)****, “Sports Training is a planned and controlled process in which, for achieving a goal, changes in complex sports motor performance, ability to act and behavior are made through measures of content, methods and organization”*

***According to Matwejew(1981)****, “Sports training is a basic form of preparation of sportsman”.*

***According to Theiss Schnabel (1986)****, “Sports Training is a scientifically based and pedagogically organized process which through planned and systematic, effect on performance ability and performance readiness aims at sports perfection and performance improvement as well as at the contest in sports competition”*

***According to Hardayal Singh (1993),*** *Sports training is a pedagogical process, based on scientific principles, aiming at preparing sportsmen for higher*

*performances in sports competitions.*

## Aims of Sports training

1. *Physical Fitness or Condition*
2. *Technical Skill*
3. *Tactical Efficiency: Knowledge of Competition rules and possibilities of various internal and external factors for achieving best possible results; tactical abilities and tactical skills.*
4. *Education: a) Beliefs, Values, Motives, interest, attitudes etc. b) Cognitive Ability c). Emotional Abilities d). Personality Traits e) Habits*

## Characteristics of Sports training

1. *Performance in a sports competition*
2. *Planned and Systematic*
3. *Scientific*
4. *Coach as leader*
5. *Controlled daily routine*
6. *Educational Process*
7. *Process of Perfection*

## General Principles of Sports training

* 1. *Principle of Formulation of Training basis of prognostic performance.*
  2. *Principle of Continuity of Training*
  3. *Principle of Progression of Load*
  4. *Principle of Uniformity and differentiation*
  5. *Principle of Progressive Specialization*
  6. *Principle of Planned and systematic training*
  7. *Principle of Cyclicity of Training*
  8. *Principle of Regulation of Training*

## Training Load

**Meaning:** to describe the cumulative amount of stress

placed on an individual from a single workout or over a period of time.

* + - *In training, load is always given for improvement but also for maintenance and stabilization of performance capacity. Load is also given sometime for the purpose of accelerating the recovery processes.*
    - *Training load feature tells us how hard the training session had been and how much time we will need to recover fully from it before further training.*

#### Training Load Definition

*Load is defined as the process of tackling training and competition*

*demands which cause temporary disturbance of psychic and physical state of homeostatis (various chemical changes*).

*Training load is psychological and physiological demand put on the organism through motor stimulus resulting the improvement and maintenance of performance capacity.*

***Training theory*** *encompasses all aspects of fitness knowledge, including social, psychological, and scientific. The coach uses this information, along with knowledge about the athlete as an individual, to devise the most effective training programme.*

#### Training Load

* *The training state of a person develops as a result of application of motor stimulus(movement) resulting in improvement and maintenance of performance.*

|  |  |  |  |
| --- | --- | --- | --- |
| * ***Some*** | ***Facts*** *: Load is* | *not always given for* | *improvement* |
| *Also* | *for Maintenance* | *and stabilization of* | *performance* |

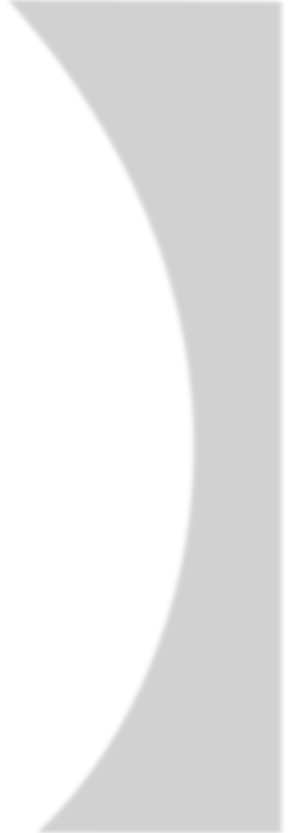
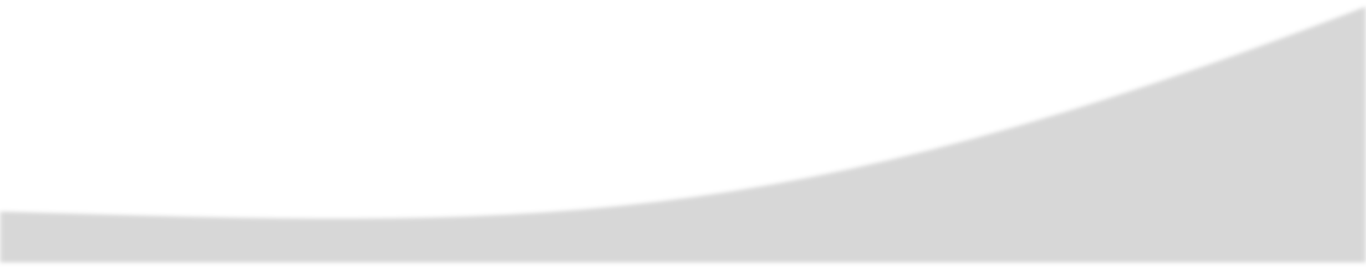
capacity. Loads are also administered sometimes for the purpose of bringing about recovery . Load are also known as fatigue producing and Non-fatigue producing

***Types of Training Load***

*There are two types of training load .*

* + ***Inner Load*** *(Is difficult to measure Symptoms : Sweating, Color of skin, Quality of Movement Increase of Heart Rate etc)*
  + ***Outer Load*** *(Quality of Movement, Physical Exercise , Volume of load etc..)*

– ***Features of Training Load***



**Features of Training Load**

**Training Load**

**Quality of Movement**

**Physical Exercise**

**Outer Load**

**Inner Load**

**Intensity of Load**

**Volume of Load**

**Intensity of**

**Stimulus**

**Duration of Stimulus**

**Density of Stimulus**

**Frequency of Stimulus**

**Symptoms : Sweating,**

**Color of skin.**

**Quality of Movement Increase of Heart Rate etc.**

Features of Training Load

***Quality of Movement****: Has direct influence on training load*

* *Degree of difficulty of movement execution can increase training load*
* *Its accurate measurement is difficult.*

***Physical Exercise****: Classified as General, Special and competitive*

* *Exercise as per the body parts involved*
* *Different type of load produce different types of effect on performance*

***Features of Training Load***

***Intensity of Load :*** *Degree of effort while performing exercise*

* + *Degree of Effort = amount of Force X Time spent*
  + *Intensity of Stimulus (Movement Intensity),*
  + *Density of Stimulus (Load Density )*

***Features of Training Load***

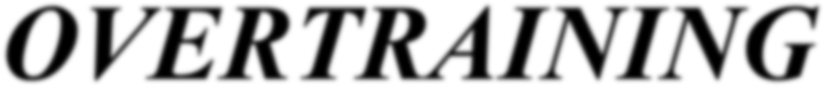
***Volume of Load :*** *Total amount of work done while performing an*

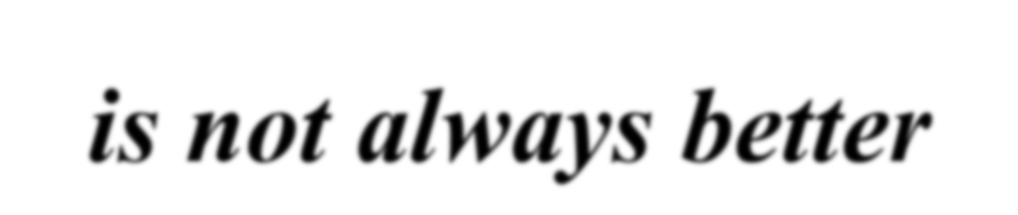
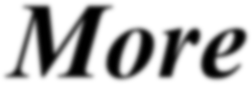
*exercise or training session.*

* + *Intensity of Stimulus (Movement duration), Frequency of stimulus (Movement Frequency),*

***Principles of Intensity of Stimulus:*** *Stimulus intensity of less than 30% has no development effect*

* + *In Cardio Vascular exercise ,speed /intensity shall bring effect bon the heart and circulatory system.*
  + *Only high Stimulus intensity creates super compensation effect, HIGH Stimulus intensity = rapid improvement but performance is less stable.*
  + *Moderate Stimulus Intensity = Slow Improvement in performance but is more stable.*

***OVERTRAINING***

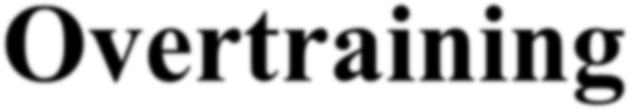


***More is not always better***

###### How do you become overtrained?

* + *Too long*
  + *Too hard*
  + *Too often*
  + *Too soon*
  + *Too much of one thing*
  + *Other factors:*

– *Improper nutrition, extreme heat, extreme cold, high altitude, mental stress*

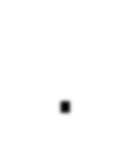
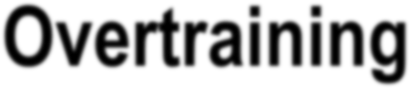


**Overtraining**

*The only way to continue to improve exercise performance with training is to progressively increase the training stress.*

*However, when this concept is carried too far, pushing the body beyond its ability to adapt, the training may became excessive.*

*An excessive training produces no additional improvement in conditioning or performance and can lead to a chronic state of fatigue.*



**Overtraining.**

*This condition is termed*

### Overtraining

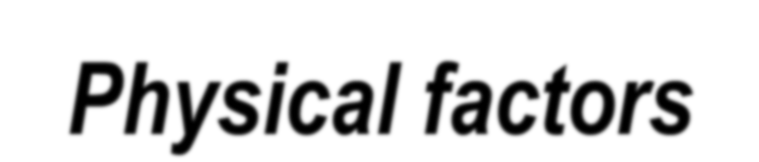
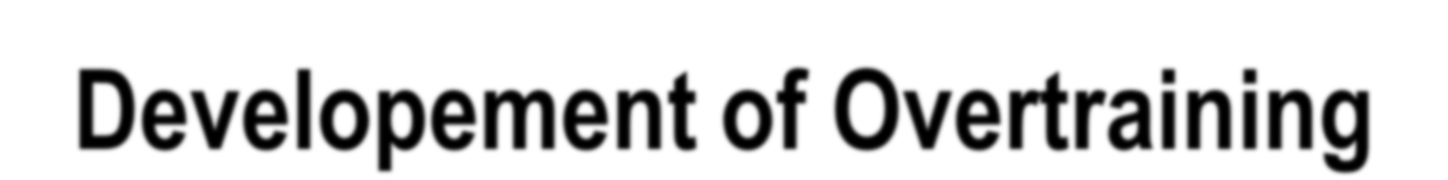
* *Also known as “staleness” or Over load*
* *“Excessive overload which negates the benefits of months of hard training, leaving you unable to produce a performance representative of your potential”*
* *Imbalance between training & recovery*

##### Overtraining (Cont.)

* *A long term decrement in performance that occurs in response to buildup of training and non training stressors.*
* *Overload is a state of decreased performance capacity. The state of overload is not the outcome of training or competition load or some other effect on the sportsman in one or two days. it occurs over a longer period and is state of concern for the coach and sportsman both as it can destroy the achievement of training for a year or even more.*

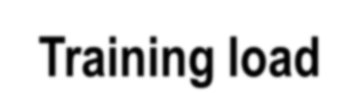
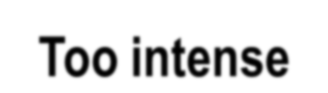
Overtraining (cont.)

Overtraining is an imbalance between exercise and recovery in which the athlete’s training program execeeds the body’s physiologic and psycological limits and causes fatigue and reduced functional capacity.



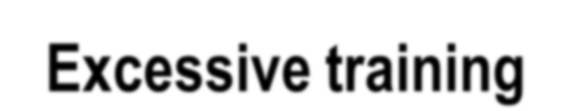
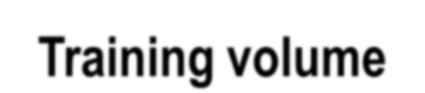
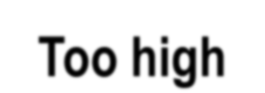
**Developement of Overtraining**

***Physical factors***



**Too intense**

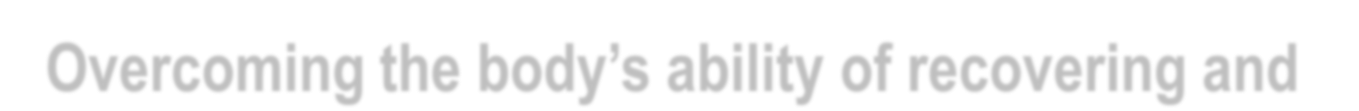
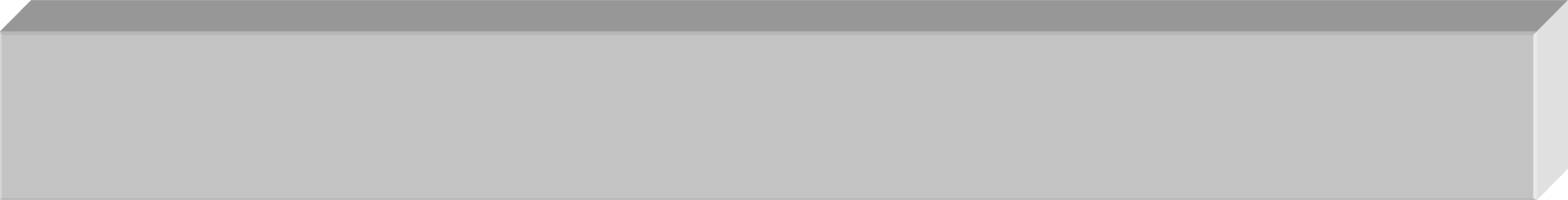
**Training load**



**Excessive training**

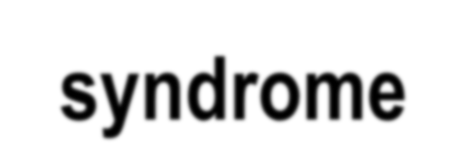
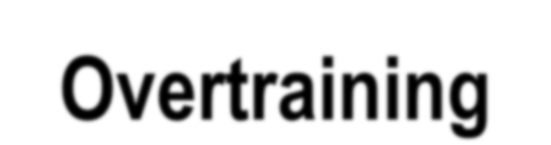
**Too high**

**Training volume**



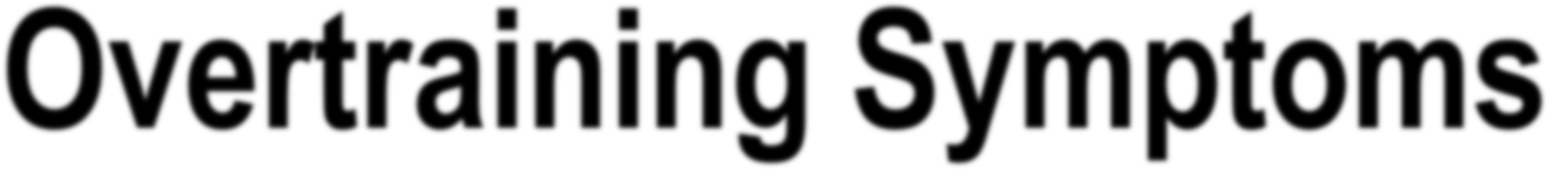
**Overcoming the body’s ability of recovering and**

**adapting**



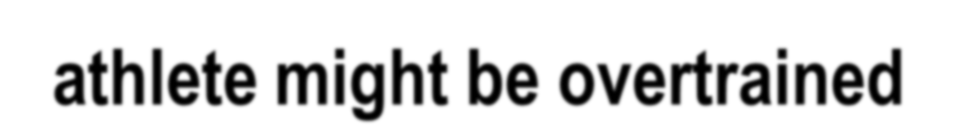
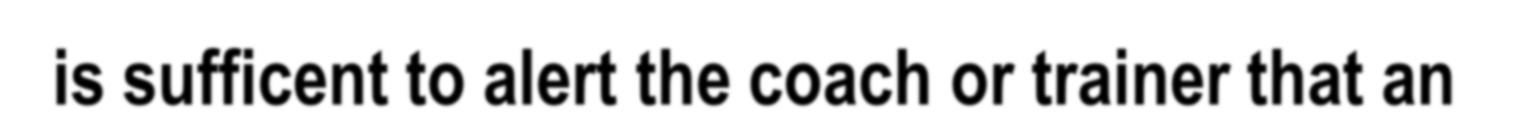
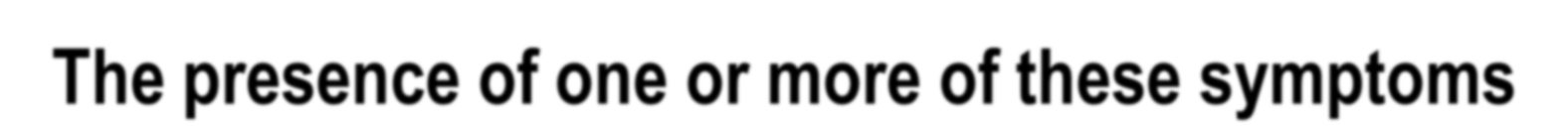
**Catabolism > Anabolism**

**Overtraining syndrome**

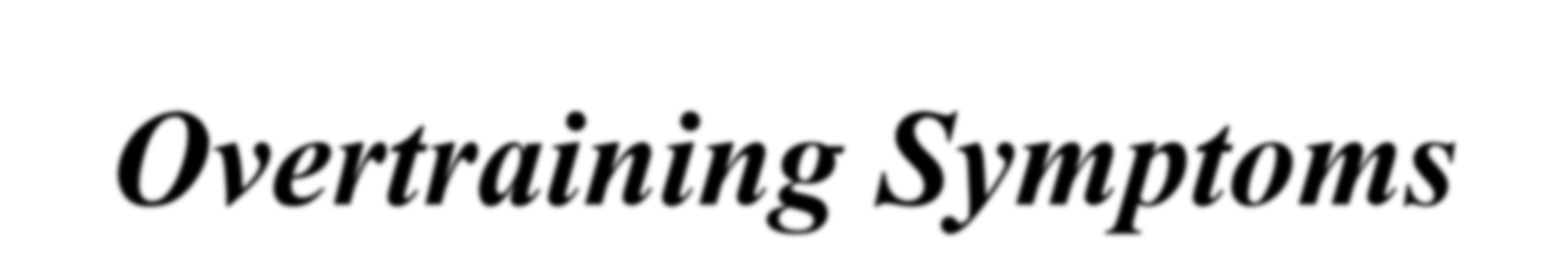


**Overtraining Symptoms**

**The symptoms of overtraining are highly individualized and subjective, so they cannot be universally applied.**



**The presence of one or more of these symptoms is sufficent to alert the coach or trainer that an athlete might be overtrained**



***Overtraining Symptoms***

*Overtraining is characterized by a sudden decline in athlete’s performance that cannot be remedied by a few days of rest and dietary manipulation.*

*It must be distinguished from Fatigue that often follows one or more exhaustive training session that is usually corrected by a few days of rest and a carbohydrate-rich diet.*

*Somatic functional Symptoms*

* *Loss of sleep*
* *Loss of appetite*
* *Loss of weight*
* *Disturbances of digestion.*
* *Increased susceptibility to injuries and infections*
* *Decreased in vital capacity.*
* *Slower recovery.*

*Performance Symptoms*

* *Movement co-ordianation, re occurrences of previous errors, increased inclination to technical errors, tensed movements.*
* *Disturbances in movement rhythm, and movement flow, decrease in ability to concentrate, decrease in the ability to differentiate and to correct. Increased inclination to injuries.*
* *Condition detoriation of strength speed and endurance abilities lengthen of period of recovery.*

### Performance Symptoms(cont.)

* + *Competition qualities decrease in readiness for competition, competition fear, tendency to give in during tough competition especially at finish, losing one's calm during competition, unable to follow one's strategy, at risk to demoralizing influences.*

*Psychic Symptoms*

* *Increase excitability, obstinacy. tendency to hysteria, tendency to doubt, quarrelsome, decrease coach and colleagues, oversensitive to criticism.*
* *Depression, loss of drive and motivation indifference*
* *Uneasiness lack of confidence.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***S.No*** | ***Major Error in Training Process*** | ***Way of Life*** | ***Environment*** | ***Health Disturban ce*** |
| *1* | *Recovery is ignored ( incorrect formulation of micro & meso cycle* | *Insufficient sleep, irregular daily routine* | *Overstress due to family duties & demand* | *Fever, infection, cold & Cough* |
| *2* | *Rapid increase of load without stabilizing adaptation* | *Use of alcohol and other intoxicants* | *Family tension unsatisfactory job* | *Digestive infection & disturbanc e* |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***S.No*** | ***Major Error in Training Process*** | ***Way of Life*** | ***Environment*** | ***Health Disturbance*** |
| *3* | *Rapid increase of load after training break* | *Excessive tea and coffee* | *Tension with colleagues friend etc.* | *After effect of infection and illness* |
| *4* | *Too high volume of load with maximal & sub maximal intensity* | *Bad living*  *conditions* | *High load due to*  *job* | *Injuries illness* |
| *5* | *Too high intensity in*  *endurance training* | *Insufficient leisure time or improper use of leisure time* | *Mental load due to study in school college* | *---* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***S.No***  ***.*** | ***Major Error in Training***  ***Process*** | ***Way of Life*** | ***Environment*** |
| *6* | *Excessive technique training for complex and difficult movement without adequate active recovery* | *Inadequate or*  *unbalanced diet* | *Poor result in*  *examination and test* |
| *7* | *Too many competition with high demands and involving frequent disturbance of daily routine and insufficient training* | *Fast living, frequent losing or gaining weight* | *Continue struggle with people who do not like sports. tension and stress through TV press.* |
| *8* | *Excessive use of only one type of training means.* |  |  |
| *9* | *Lack of faith in coach* |  |  |
| *10* | *Frequent unsuccessful experience because of unrealistic goals.* |  |  |

*Avoid overtraining*

#### Remedy

1. *Training Methodical means*
2. *Nutrition & physiotherapeutic means*
3. *Psychological means.*

###### Training Methodical means

*Training session carefully planned & carried out*

1. *Allow for proper warm-up.*
2. *Allow for proper cool-down*
3. *Sequence of Exercise & task*
4. *Rest & pause*
5. *Vary Class Type*
6. *Class Intensity*
7. *Limit High Impact Classes*
8. *Limit Active Demo-use Cues*
9. *Decrease Schedule*
10. *Reduce training*

###### Nutrition & Physiotherapy means

1. *Sports man Should take Balanced diet*
2. *Total Five meal should be taken*
3. *Fast food, unhealthy diet should be avoided*
4. *Rich carbohydrate, minerals &vitamins*
5. *Meal timing should be fixed*
6. *Ensure Proper Hydration*
7. *Physiotherapeutic means should be used for recovery sauna, steam, Jacuzzi, massage*
8. *Rest*

###### Psychological means

1. *Yoga & Meditation*
2. *Auto suggestion & progressive relaxation technique.*
3. *Counseling*
4. *Travelling & journey*
5. *Mental Relaxation training should be followed.*

#### Training means

High sports Performances through sports training can be achieved by a scientific and systematic use of training means. Training means are various physical exercises and other objects, methods and procedures which are used for the improvement, maintain and recovery of performance capacity and performance readiness. It’s a long term process it an be classified into following groups.

|  |  |  |
| --- | --- | --- |
| ***S. No.*** | ***Training Means*** | ***Effects*** |
| *1.* | *Principal means of training – Physical Exercise: General, special & Competition* | *Physical Fitness or condition technical skill, tactical efficiency psychic factors, recovery and relaxation* |
| *2. (A)* | *Addition means of Training*  *(A). Pedagogical measures-\*  *- Demonstration, Explanation, verbal instructions, task of observation study etc. , lectures & Discussions* | *Movement concept, feed back, mental abilities, active participation, interest and motivation, personality* |
| *B* | *Medical and physiotherapy means: Nutrition, massage, hygienic measures, Physio- therapy, means and methods of biochemistry* | *Health, Recovery and relaxation, prevention from infections, etc. (resistance) , rehabilitation, control of activation, judgment of load and recovery,assesments of training effects.* |

|  |  |  |
| --- | --- | --- |
| ***S.***  ***No.*** | ***Training Means*** | ***Effects*** |
| *C* | *Psychological Means*   1. *Ideo motor Training* 2. *Autogenous Training* 3. *Pyscho tonic Training* | *Technical Skill, Tactical Efficiency, recovery and relaxation, control of activation, behavior control, removal of fear & complexes, Psychic preparation* |
| *D.* | *Bio-mechanical Mean*   1. *Cinematography* 2. *Measuring Devices* | *Technical Skill assessment, feedback regarding biomechanical aspects of Sports movement* |

|  |  |  |
| --- | --- | --- |
| ***S.***  ***No.*** | ***Training Means*** | ***Effects*** |
| *E.* | *Natural Means:*   1. *Light, air, water* 2. *Weather condition* 3. *Altitude* | *Affect on Load, health, resistance to infections, physical fitness* |
| *F.* | *Material Objects:*   1. *Audio Visual aids* 2. *Training Equipments apparatus* | *Movement Concept, feed back, motivation, Physical Fitness, technical skills, Tactical Efficiency* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Effects of Basic method of Conditioning*** | | | |
| ***Method*** | ***Training Effects*** | ***Physiological Effect*** | ***Psychic Effect*** |
| *Continuous Method* | 1. *Basic Endurance* 2. *General Endurance* 3. *Strength Endurance* | *Economy of Aerobic Metabolism*  *Cardio Respiratory*  *System* | *Will power Psychic Endurance, ability to tolerate pain and discomfort* |
| *Interval*  *Method*  *A. Extensive* | 1. *Basic Endurance* 2. *General Endurance* 3. *Strength*   *Endurance* | *Economy of Aerobic*  *Metabolism Cardio Respiratory System* | *Psycho Physical mobilisation, ability to improve tried, will power* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Effects of Basic method of Conditioning*** | | | |
| ***Method*** | ***Training Effects*** | ***Physiological Effect*** | ***Psychic Effect*** |
| *B. Intensive* | 1. *Speed Endurance* 2. *Explosive Strength* 3. *Strength Endurance* 4. *Maximum Strength* | *Hypertrophy of Muscles & Heart Economy of Anaerobic Metabolism*  *, Cardio Respiratory*  *System* | *Psycho Physical mobilisation, ability to improve when very tried* |
| *Repetition*  *Method* | 1. *Speed Abilities* 2. *Maximum Strength* 3. *Explosive Strength* 4. *Speed Endurance* | *Muscles Hypertrophy Neuro muscular Coordination*  *Lactic acid tolerance* | *Ability to give maximal performance psychic Thrust, Competition Specific psycho physical load tolerance* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Common variations of Basic methods of Conditioning*** | | | |
|  | ***Continuous Method*** | ***Interval Method*** | ***Repetition Method*** |
| *Characteristics* | 1. *Continuous activity without pause* 2. *Low Intensity* 3. *Very High Volume* | 1. *Activity with Pauses or intervals of Incomplete Recovery* 2. *Medium to high*   *Intensity*   1. *Low to medium*   *Volume* | 1. *Psycho Physical mobilisation, ability to improve when very tried* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Common variations of Basic methods of Conditioning*** | | | |
|  | ***Continuous Method*** | ***Interval Method*** | ***Repetition Method*** |
| *Variation* | 1. *Slow Continuous*   *Method*   1. *Fast Continuous*   *Method*   1. *Changing Pace*   *Method*   1. *Fartlek* 2. *Playing or combating for a long time without Pause* | 1. *Intensive Interval*   *Method*   1. *Extensive Interval Method* | 1. *Competition*   *and trials*   1. *Playing or*   *combating at very high intensity but with pause of complete recovery*   1. *Speed Training* 2. *Maximum*   *Strength*  *Training* |

BIO-MOTOR ABILITIES

* ***The bio-motor abilities*** *are components of overall physical fitness, "bio-motor abilities affect how the body moves.*
* *An ability that is specifically related to the performance of a motor skill*
* *To develop the specific fitness required for an event it is necessary for the coach to understand the characteristics of the five bio-motor abilities and how to develop them.*

## BIO-MOTOR ABILITIES (cont.)

* + ***Bio-motor abilities****- Abilities whereby the body can perform a range of activities, such as strength, speed, and endurance. They are influenced by training and may be genetically determined.*
  + *There are five basic bio-motor abilities and these are strength, endurance, speed, flexibility and coordination.*

## BIO-MOTOR ABILITIES (cont.)

* + - *There are five basic bio-motor abilities and these*
    - *Strength,*
    - *Endurance,*
    - *Speed,*
    - *Flexibility*
    - *Co-ordination.*

#### What is strength?

* ***Strength*** *is the amount of force your muscles can produce. How much resistance you can overcome, how much weight you can lift.*
* ***Strength*** *is the ability to overcome resistance or to act against resistance.*
* ***Strength*** *– the extent to which muscles can exert force by contracting against resistance (holding or restraining an object or person)*
* ***Strength*** *is better defined as the ability of neuromuscular system to produce force against an external resistance.*

#### Strength

* + *Strength is important to every event for both men and women. Muscle fibers within the muscles respond when subjected to weight or resistance training. This response makes the muscle more efficient and able to respond better to the central nervous system. Strength may be broken down into three types:*
    - *Maximum strength*
    - *Explosive strength*
    - *Strength endurance*

#### Maximum Strength

* + *It is the ability to overcome or to act against maximal resistance.*
  + *Refers to the highest force the neuro-muscular system can generate during a maximum voluntary contraction.*
  + *This is the greatest force that a contracting muscle can produce. Maximum strength does not determine how fast a movement is made or how long the movement can be continued. It is important in events where a large resistance needs to be overcome or controlled.*
  + *Ex. weight lifting, throwing etc.*

#### Explosive Strength

It is a combination of strength and speed abilities. It can be defined as the ability to overcome resistance with high speed.

Elastic strength is the type of strength required so that a muscle can move quickly against a resistance. This combination of speed of contraction and speed of movement is sometimes referred to as "power". This special type of strength is of great importance to the "explosive" events in running, jumping and throwing.

#### Explosive Strength(cont.)

*Explosive strength can be further sub-divided into –*

* ***Start strength****: ability to develop maximal muscles force during the starting phase of the movement; sprint start*
* ***Strength speed (power****): ability to overcome heavy resistance with high speed. Throws, jump*
* ***Speed strength:*** *is the ability to overcome lower resistance with high speed. Team game., combat sports*

#### Strength Endurance

* *It is the ability to overcome resistance or to act against resistance under condition of fatigue.*
* *It is also product of two motor abilities*
* *Strength + Endurance =* ***Strength Endurance.***
* *Strength endurance further classified in two forms:*
* ***Strength endurance*** *is the ability to overcome high resistance or to act against high resistance under condition of fatigue ex. combat sports, long duration events requiring strength pole vault.*
* ***Endurance strength*** *is needed for activities in which low resistances are to be tackled ex. Swimming, road cycling.*

##### Strength

* + ***Static Strength****: it is the ability to act against resistance. It is also called iso metric strength.*
  + ***Dynamic strength****: it is ability to overcome resistance. It also known as isotonic strength.*
  + ***Relative strength:*** *it is not a strength ability. It is simply a ratio by dividing maximum strength with body weight.*

Strength Endurance

* + - *This is the ability of the muscles to continue to exert force in the face of increasing fatigue. Strength endurance is simply the combination of strength and duration of movement. Performing an exercise, such as sit-ups, to exhaustion would be a test of strength endurance. This strength characteristic determines an athlete's performance where a movement is repeated over a fairly long period of time. Runs between 60 seconds and 8 minutes, for example, require a lot of strength endurance.*

## Importance of Strength Training(cont.)

* *The role of* ***strength training*** *for general health, good posture and for prevention of injuries*
* *Many people take up weight training to improve their* [***physical***](http://www.ask.com/wiki/Physical_attractiveness?qsrc=3044)[***attractiveness***](http://www.ask.com/wiki/Physical_attractiveness?qsrc=3044)*. Most men can develop substantial muscles; most women lack the* [*testosterone*](http://www.ask.com/wiki/Testosterone?qsrc=3044) *to do it, but they can develop a firm, "toned"*
* *The* ***body's*** [***basal***](http://www.ask.com/wiki/Basal_metabolic_rate?qsrc=3044)[***metabolic***](http://www.ask.com/wiki/Basal_metabolic_rate?qsrc=3044)[***rate***](http://www.ask.com/wiki/Basal_metabolic_rate?qsrc=3044) ***increases*** *with increases in muscle mass, which promotes long-term* [*fat*](http://www.ask.com/wiki/Dieting?qsrc=3044)[*loss*](http://www.ask.com/wiki/Dieting?qsrc=3044) *and helps dieters avoid* [*yo-yo*](http://www.ask.com/wiki/Yo-yo_dieting?qsrc=3044)[*dieting*](http://www.ask.com/wiki/Yo-yo_dieting?qsrc=3044)*.*[*[*](http://www.ask.com/wiki/Strength_training)
  + SPEED





## Speed

**Speed**: The ability to move quickly from one point to

another in a straight line

Speed is the capacity or to travel move very quickly.

It is the performance prerequisite to do motor actions under given conditions (movement task, external factors, individual pre requisites) in minimum of time.

Speed is the expression of a set of skill and abilities that allows for high movement velocities.

## Definition

* *The definition of speed from a scientific standpoint is simply distance / time, but this is a rather simplistic view of speed. A more accurate definition of speed is this: speed is the ability of an athlete to move as fast as possible, through the optimal range of motion, in a deliberate and intentional manner, in a particular direction.*
* *Sports Definition: Speed is the ability to move quickly across the ground or move limbs rapidly to grab or throw.*

## Speed (cont.)

speed can be broken down into different types. It may mean the whole body moving at maximal running speed, as in the sprinter. It may involve optimal speed, such as the controlled speed in the approach run of the jumping events. Or, it may include the speed of a limb, such as the throwing arm in the shot or discus, or the take-off leg in the jumps.

* + *The ability to perform a movement quickly. For example, 100m sprint.*

## Calculating Speed

* + - ***Speed (S)*** *= distance traveled (d) / the amount of time it took (t).*

**S = d/t**

#### Calculating Average Speed

* *It took me 1 hour to go 40 km on the highway. Then it took me 2 more hours to go 20 km using the streets.*
* ***Total Distance:***

– *40 km + 20 km = 60 km*

* ***Total Time:***

– *1 h + 2 h = 3 hr*

* ***Ave. Speed:***

– *total d/total t = 60 km/3 h = 20 km/h*

*Ave*. \_

*Speed*

 *Total* \_ *Dist*.

*Total* \_ *time*

## Reaction Ability

it is the ability to react effectively and quickly to a signal. In sports, signals can be of different type e.g., visual, tactile, acoustic.

Depending on the degree of complexity of the reaction required the reaction ability can be further differentiated into simple and complex reaction ability.

## Movement Speed

* *it is the ability to do a single movement in minimum of time. Movement speed is of high relevance in acyclic sports.*

In cyclic sports it is important in the initial phase (e.g. start movement) or in some phases during the total period of cyclic activity e.g.. Turns in swimming and hurdle clearance in hurdle event acyclic sports movement speed is very closely bound with technical and tactical action.

## Acceleration Ability

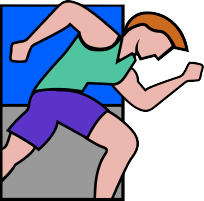
it is the ability to achieve speed of locomotion from a stationary position or from a slow moving position. Acceleration ability depends to a great extent on explosive strength, technique and movement frequency. performances in sprint events are determined to a great extent are determined to a great extent by acceleration ability. Acceleration ability is also of crucial importance in all team games and racket sports where high running speeds are to be achieved over short distance.

## Loco motor Ability

* *it is the ability to maintain maximum speed of locomotion for maximum possible duration or distance. Loco motor ability is important in only a few sports or events e.g. 100mt and 200mt in track and field, short sprints in track cycling and speed skating.*
* *In swimming , rowing etc. loco motor ability depends to a great extent on mobility of the nervous system which allows for high movement frequency.*

#### Speed Endurance

it is the ability to do sports movements with high speed under condition of fatigue. Speed endurance is a combination of speed and endurance ability. It is of a different nature in cyclic and non cyclic sports. In cyclic sports the speed endurance is required to continue movements with high speed in spite of rapid accumulation of fatigue during the activity. In non cyclic sports the speed endurance is required to do movements again and again with maximum possible speed under condition of fatigue. E.g. repeated sprint in football , speed endurance considerably on anaerobic capacity, technique and psychic factors.

***Endurance***

Endurance refers to the ability to perform work of a given intensity over a time period, and is sometimes called stamina.

The main factor which limits and at the same time affects performance is fatigue. Endurance, of all the bio-motor abilities, should be developed first.

Without endurance it is difficult to repeat other types of training enough to develop the other components of fitness.

## Endurance (cont.)

* ***Harre (1986),*** *“Endurance as the ability to resist fatigue.*
* ***Thiess and schnabel (1987),* “***Endurance as the resistance ability to fatigue.*
* *“Endurance is the ability to do sports movements, with the desired quality and speed under conditions of fatigue.*

#### Endurance (cont.)

*It relates to doing work for a long time or period. It relates to working under fatigue conditions.*

*It involves a large number of muscles. It involves work efficiency.*

#### Endurance (cont.)

Endurance performance are of different nature in different sports.

Basic Endurance:

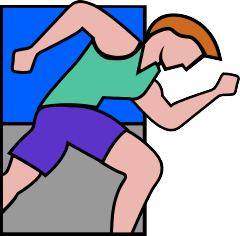
it is the ability to do movements involving large number of muscles at a slow pace for prolonged period e.g.. Jogging, swimming, walking at moderate speed for periods lasting more than 30 minutes. For sedentary and untrained persons the duration can be significantly less

## General Endurance

it is the ability to do sports movement of general nature under conditions of fatigue. General endurance is not specific to any sports and is developed through general exercises. It is very difficult to precisely say what is general endurance as it enables the sports man to work under fatigue conditions caused by different types of movement done with different intensity and for different duration.

## Specific Endurance

it is the ability to do sports movements of a particular sports under conditions of fatigue. Depending on the nature of sports, the specific endurance may be largely determined by aerobic or anaerobic capacity (metabolism) or by a certain combination of both.

in a cyclic sports specific endurance is intricately combined with technical and tactical components of performance capacity, in which movements are done at slower pace but for long duration (marathon), the specific endurance can be practically equated with basic endurance.

## Endurance

From the viewpoint of duration of activity, endurance can be divide d into 4 types. This classification is based on the concept of harre the activities which last for less than 20 – 22 second are not endurance activities.

These are speed activities.



## Speed Endurance

This ability is required for cyclic activities lasting up to 45 seconds. The 400mt sprint in track and field is a classical example of speed endurance ability. This ability is highly dependent on the power and the capacity of gycolytic mechanism of energy production.



## Short Time Endurance

* *This endurance ability is needed for cyclic activities lasting from about 45 seconds to 2 minutes. 800mt is a typical example of short time endurance activity.*



## Medium Time Endurance

This ability is required for cyclic activities lasting from 2 to 11 minutes, typical example of cyclic activities requiring medium time endurance are 1500 and 3000mt in track and field and 100mt in rowing.

## Long Time Endurance

The long time endurance is needed for cyclic activity lasting more than 11 minutes. The energy production is achieved mainly from oxidation of glycogen

# Co-ordination

###### Co-ordination

*Coordination is the ability to perform movements of various degrees of difficulty very quickly and with efficiency and accuracy. It is considered that an athlete with good coordination is capable not only of performing a skill well, but also of rapidly solving a training task.*

###### Co-ordination

Co-ordinative abilities are primarily dependent on the motor control and regulation processes of CNS.

***Zimmermann (1983), Hirtz (1985), Harre (1986) and Meinel and Schnabel (1987****) the following definition is proposed:*

“Co-orinative abilities are understood as relatively stabilized and generalized patterns of motor control and regulation processes. These enable the sportsman to do a group of movement with better quality and effect.”

Differentiation Ability

It is the ability to achieve a high level of fine tuning or harmony of individual movement phase and body parts movement. It finds expression in high degree of accuracy and movement economy.

The high level of differentiation ability depends on movement experiences and the degree of mastery over motor action. Aim is to achieve high level of mastery over sports movement and their effective application in sports.

E.g. highly precise and accurate movement in gymnastics, in football expression in dexterity of feet and head.

### Orientation Ability

* *It is the ability to determine and change the position and movements of the body in time and space in relation to a definite field of action. E.g. playing field, boxing ring, apparatus and or a moving object.*
* *e.g. ball, opponent and partner.*

#### Coupling Ability

It is the ability to co-ordinate body parts movements (e.g. , movements of hand, feet trunk etc.) with one another and in relation to a definite goal oriented whole body movements important in which high degree of difficulty football the foot movement for ball control or dribbling have to be coupled with the whole body movements of running jumping etc.

*Reaction Ability*

it is the ability to react effectively and quickly to a signal. In sports, signals can be of different type e.g., visual, tactile, acoustic.

Depending on the degree of complexity of the reaction required the reaction ability can be further differentiated into simple and complex reaction ability.

*Balance Ability*

It is the ability to maintain balance during whole body movements and to regain balance quickly after the balance disturbing movements. Balance ability is two types:

Ability to maintain balance during stationary position or slow movements **(static balance).**

Ability to maintain or regain balance during large range movements and during rapidly changing position of the body. **(Dynamic balance).**

###### Rhythm Ability

It is the ability to perceive the externally given rhythm and to reproduce it in motor action. It also denotes the ability to reproduce a rhythm, existing in motor memory, in motor action.

*Adaptation Ability*

*It is the ability to adjust or completely change the movement programme during the movement on the basis of changes or anticipated changes in the situation.*

*The situational changes may be expected ones or may suddenly take place.*

*E.g. running, cycling etc.*



# Flexibility

#### Flexibility

*is the ability to perform joint actions through a wide range of motion. The natural range of motion of each joint in the body depends on the arrangement of tendons, ligaments, connective tissue and muscles.*

*The limit to a joint's range of motion is called the "end position". Injuries can occur when a limb or muscle is forced beyond its normal limits.*

*Flexibility training can help reduce the risk of injury by gradually increasing a joint's range of motion.*

#### Flexibility (Cont.)

* *It is the key components for general fitness as well as for sports fitness.*
* *Flexibility should be part of our exercise routine.*
* *Flexibility is one of the major factors for success in many sports performance.*
* *Flexibility allows muscles and joints to move through their full range of motion.*
* *Poor flexibility of the back and hips may lead to stiffness, poor posture, back problems, movement limitations, and a higher risk of injury to muscles and ligaments.*
* *to increase our physical performance, the joint ability to move freely with less expenditure of energy.*

## Flexibility (Cont.)

* *Flexibility can be defined as the ability to execute movements with greater amplitude or range.*
* *Flexibility is the ability to perform joint actions through a wide range of motion. The natural range of motion of each joint in the body depends on the arrangement of tendons, ligaments, connective tissue and muscles. Flexibility is defined as the static maximum range of motion (ROM) available about a joint.*

## Flexibility (cont.)

* + *Flexibility is defined by Gummerson as "the absolute range of movement in a joint or Series of joints that is attainable in a momentary effort with the help of a partner or a Piece of equipment”*
  + *This definition tells us that flexibility is not something general but is specific to a particular joint or set of joints.*

## Active Flexibility

the ability to do movement with greater amplitude without external help is called active flexibility. E.g.. Stretching a joint by a sportsman himself without any external help.

**Active flexibility** is always less than the passive flexibility and a large difference between the two indicates lack of muscle strength or co-ordination or both.

#### Active Flexibility (Cont.)

*is also of two types, static and dynamic.*

***Static Active flexibility*** *is required for movements done while the sportsman is standing, sitting, or lying. For example, lifting the leg and keeping it high without any external support (other than from your own leg muscles).*

## Dynamic Flexibility

* ***Dynamic flexibility*** *(also called kinetic flexibility) is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through its full range of motion in the joints.*
* ***Dynamic flexibility*** *is required for executing movements with greater when the sportsman is moving. The dynamic flexibility is always less than static flexibility and is heavily dependent on the motor co-ordination.*

#### Passive Flexibility

The ability to do movements with greater amplitude with external help is called passive flexibility. E.g. stretching exercise with the help of a partner.

The passive flexibility is always more than active flexibility and is largely determined by the joints structure and stretch ability of the muscles and ligaments.

Passive flexibility is the basis of active flexibility.

#### General Flexibility & Special Flexibility

**General Flexibility-** In the term general flexibility is used to denote the level of flexibility of all the important joints of the body e.g. shoulder, trunk and hip. It is not used in reference to any particular sport or activity.

**Special Flexibility-** however should be understood to be the ability to do specific movement or movements of a sports with greater amplitude.

## Active Flexibility (Cont.)

* ***Static-passive flexibility-*** *Static-passive flexibility (also called passive flexibility) is the ability to assume extended positions and then maintain them using only your weight, the support of your limbs, or some other apparatus (such as a chair or a barre). Note that the ability to maintain the position does not come solely from your muscles,*
* *As it does with static-active flexibility. Being able to perform the splits is an example of static-passive flexibility.*

#### Improvement of Flexibility

* 1. ***Ballistic Method:*** *In this method a joint is stretched rhythmically to its maximum range. The stretching method is done with a swing hence the name ballistic method.*
     + *High Risk of Injury*
     + *For improvement large no of repetition required*
     + *Specific to the nature of Sports*
     + *This method used after passive and active flexibility*

#### Improvement of Flexibility (Cont.)

* 1. ***Slow Stretch & Hold Method:*** *the joint is slowly stretched to the maximum limit and is held for a few second before returning to the original position.*

State of maximum Stretch 3 to 8 Second Long duration do not effect to increase. It is a very effective method

For better effect the help of a partner should be taken in this method.

#### Improvement of Flexibility (Cont.)

* 1. ***Post Iso metric Stretch****: in this method muscles contracted iso-metrically for 6 to 7 sec.. The iso-metric contraction should be maximal. After this the muscles is gradually stretched to its maximum limits and is held in this position for 8 to 10 sec.*

This method is to be repeated 4-8 times for each muscles Group.

#### Improvement of Coordination

1. *The Principle method is varied practice and the principal means are learnt the physical exercises*
2. *General and Specific Exercise should be Used*
3. *The Movement should be done correctly and consciously*
4. *Additional means for improving motor sense organs should be used*
5. *Accentuated development of Coordinative abilities*
6. *There should be a rich variation of exercise*
7. *Systematic increase in the difficulty of Coordination.*

#### Improvement of Coordination (Cont.)

1. *Variation in movement execution*
2. *Variation in external conditions*
3. *Combinations of movements*
4. *Change in Information uptake*
5. *Practice against time.*
6. *Practice under fatigue*

#### Improvement of Endurance

* 1. *Continuous method*
     1. *Slow Continuous method: Exercises at a certain speed without any pause for very long duration.*

***Heart Rate:*** *140-160*

***Duration:*** *30 minutes.*

***Total Duration:*** *2 hours or even more*

**Ex**. Running, Cycling, Walking

#### Improvement of Endurance (cont.)

* + 1. *Fast Continuous method: work is done at fast but unchanging pace for long durations without any braek.*

***Heart Rate:*** *160-180*

***Duration:*** *20 minutes.*

***Total Duration:*** *2 hours or even more*

#### Improvement of Endurance (cont.)

* + 1. *Variable Pace method: Exercise is done continuously but changing pace or speed.*

***Heart Rate:*** *140-180 beats/min.*

***Duration:*** *15 minutes to 1 hour.*

#### Improvement of Endurance (cont.)

* + 1. *Fartlek method: Swedish word “Speed Play” Variation of variable pace method.*

The changing of speed or pace is not pre planned.

The sportsman changes the speed on his own during the activity.

***Heart Rate:*** *140-180 beats/min.*

***Duration:*** *15 minutes to 1 hour.*