



# **PHYSICAL FITNESS** *and* **HEALTH**

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**Printer : GRACE PRINTERS**  
27, Subba Reddy Street,  
West Mambalam, Madras-33.

**First Edition : 20-10-1989**

**Price Rs 10-00**

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| <b>2. Quotations on sports and games</b>        | <b>7-00</b> |

## **Preface**

This text is designed to bring out a Text Book to help the readers in Physical Education & sports to understand the need, principles and effects of training that are practiced by coaches, trainers, physical educators and sports lovers.

This book deals in brief, the training methods such as Weight Training, Interval Training, Circuit Training, Interval-Circuit Training, Vita-Parcours, Pressure Training, Resistance Training, Isokinetic and Plyometric and on the different types of physical exercises that are used and research finding of its effects on various systems of our body.

It is our sincere hope that students and the readers who use this text will make sound progress toward the achievement in competitive sports and academic understanding.

## Introduction to Training Methods

The record breaking achievements in Olympic games, International competitions and World Cups were made possible by the effective introduction of the training methods. As the Olympic motto is ever faster, ever higher and ever longer, FITNESS is the key work to it. Achieving the total fitness is the aim of all individuals. Total fitness to four components such as :-

- |                      |                   |
|----------------------|-------------------|
| a. Physical fitness  | b. Mental fitness |
| c. Emotional fitness | d. Social fitness |

Physical fitness is his or her potential for physical effort toward their specific task as well as toward their general fitness. The components are also based on health and motor factors. The physical fitness is influenced by several factors such as heredity, that is form and structure of the body, nutrition, good health habits (sleep, rest, relaxation etc.), emotional, spiritual and specific preparation for the game.

Fitness can be developed through training methods and experiences. The training methods are based on

scientific principles and philosophy of life. Physical conditioning brings confidence in the athlete's activity to play absolutely upto their potential. Special fitness for living.

Practice makes a man perfect : Where as in the field co-sports and games or in the field of Physical Activity, practice alone is not sufficient. The scientific principles based upon such as physiology of exercise tells us the efficiency of physical activity depends on physical fitness, mental fitness and emotional fitness. The physical fitness components such as strength, speed, endurance, co-ordination, agility, flexibility and balance can be developed through Training Methods. The concept "One must be FIT enough to play a competition" can be achieved only through induced developments in systems of our body through training methods.

In the field of motor performance, to develop these said components, several training methods are evolved. Each Training Method develops specific component or components and contributes to the general physical fitness. A very high achievement in performance in the field of sports and games was achieved through these training methods.

# Various Training Methods

1. Weight Training
2. Resistance Training
3. Cross Country Race
4. Fartlek
5. Circuit Training
6. Interval Training
7. Interval — Circuit Training
8. Vita Parcours
9. Pressure Training
10. Isokinetic
11. Plyometric.

## WHAT IS TRAINING

Training is systematic programme toward a specific purpose or development for those who have already acquired the basic knowledge/ skill in that field.

Training is systematic process of repetitive, progressive exercise or work involving the learning process; acquisition and acclamatisation.

## PRINCIPLES OF TRAINING

1. The training load should be based on frequency and intensity.
2. Training is an Individual problem: factors like age, sex, work, physical make up, sleep, rest, should be considered for training schedules.
3. Physical and emotional stress to be considered.
4. Excessive stress on the individual will lower the performance.
5. Training is specific to sport.
6. Nutrition is an important consideration in training schedule.

The above factors should be based on two important principles namely, the over load principle and the law of reversibility. Every, one who deals with sports and games should know these two principles which form the basis of training methods and physical and physiological developments.

### a. OVER LOAD PRINCIPLE

There are three aspects in over load training'' normal load'' ''crest load'' ''over load''

Over load simply means development of Hypertrophy which results from an increase in the intensity of work done in an unit of time and greater the intensity



greater the hypertrophy. This says that an activity must always be upgraded to a consistently higher level through maximal or near maximal stimulation. That is, all work should be performed with a progressively increased load or resistance or with increasing speed or near maximum rate.

The over loading may be for formal and functional. Formal over loading can be used to strengthen any muscle or muscle group either by weight training or heavy calisthenics. This may be of corrective or adopted exercises. The functional overloading means that activity that overloads the movements used in the sport/game.

Intensity of work in a systematic exercise programme can be as follows.

1. Increasing the weight, resistance or effort.
2. Increasing the speed.
3. Increasing the range of movement.
4. Increasing the duration.
5. Increasing the repetition.
6. Increasing the rest intervals.

Or any progressive addition from one's starting may result in increasing the dose which simply means overloading.

#### **b. THE LAW OF REVERSIBILITY**

This simply means any development in human body is not permanent i.e. to sustain the development the exercise

programme must be continued. This is because of the ageing process.

The effects of physical exercises on body are completely reversible except the brain changes that account for learning. Physical exercise brings the body under stress and the body adapts to this stress with a series of immediate or acute changes and if the stress continued for a chronic changes.

Acute changes are such as heart rate, respiratory rate, rise in blood pressure, concentration of blood, modified muscle-chemistry, resetting of thermostat for high temperature etc. All of these changes are temporary until we recover our normalcy. If we do not return to normal we would die.

Repeated subjection of the body to exercise stress results in relatively permanent changes in the structure. This type of changes are called chronic changes. To maintain the change the exercises must be regular. Otherwise the individual will return to normal. This principle is known as the principle of reversibility. That is why, an athlete must be conditioned first before competitions for every season.

## PHYSICAL FITNESS

1. Health Based
2. Motor Based

Physical fitness is the quality of the whole body in terms of its state of adaptation to Physical Activity.

Physical fitness implies abilities such as that of resisting fatigue, performing with an acceptable degree of motor ability and being able to adapt to muscular stress.

Physical fitness can also be functional, specific and emergency requirements.

The following are components of physical fitness as listed by Laison and Yacom.

1. Resistance to disease.
2. Muscular strength and Muscular endurance.
3. Cardiovascular—respiratory endurance.
4. Muscular power.
5. Flexibility.
6. Speed.
7. Agility.
8. Co-ordination.
9. Balance.
10. Accuracy.

Though the physical fitness components are specific but they are inter-dependent. If one component is developed the other related components are also slightly improved. Strength and Endurance are very important components to be developed first. Strength has its influence in all other components of physical fitness so strength has to be developed first.

**STRENGTH** is defined as the Capacity to exert force or the ability to do work against Resistance.

**ENDURANCE** is defined as the ability of the body to undergo prolonged activity or to resist stress set up as a result of prolonged activity.

**FLEXIBILITY** is defined as the range of movement of specific joint or groups of joints influenced by the associated bones and boney structures and the physiological characteristics of the muscles, tendons, ligaments and the various other tissues surrounding the joint.

**SPEED** is the Capacity to do fast in an unit of time. Speed is the factor resultant of power and strength.

**POWER** is a component which is made up of speed and strength. Power is commonly known as an amount of force that can be exerted by individual stimulus.

**COORDINATION**: Neuromuscular development is known as coordination. This includes the skill development also. This refers to the ability to respond several simultaneous stimuli in terms of muscular response on body motion.

**AGILITY**: The Capacity of the body to change direction when the body is in motion. It is a component of physical fitness made up of speed, flexibility and balance.



**ACCURACY :** Ability to do any thing precisely is called as accuracy. It depends on strength and endurance because as muscle gets tired the accuracy will be lost. It is a dependent component of Physical Fitness.

**BALANCE :** Ability to manoeuvre the body when the body is in motion or in rest. This is one of basic components which has to be developed in the early stages.

### **PHYSIOLOGICAL AND PSYCHOLOGICAL LIMITS**

By nature every individual has a limit to perform any thing. The maximum capacity of an individual to do a task is known as Physiological limit.

The capacity of the mind to do a task in simple language is known as Psychological limit. Experimentally in the field of sports and games, the psychological limit falls before the physiological limit i.e. physiologically one can do more but one stops early because of the psychological limit.

The main purpose of coaching and training is to make coincide these two limits, therefore the maximum of the individual is drawn out.

# Training Methods

## WEIGHT TRAINING

**DEFINITION :** Weight training is a system in which series of progressive resistance exercises are used to attain strength, stamina, speed and power.

Weight training utilizes the overload principles. It is the oldest of the training method used by man. Weight training exercises are classified as Isotonic, Isometric and Isokinetic.

Heavy weight— a few repetitions develop strength.

Bloom field's definition.

### I a) Need & Importance

over load principle/Rest period/Exaltation phase. How it is used to develop speed endurance as well cardiovascular endurance etc.

### II DEFINITIONS

### III Kinds

IV Basic Concepts.

V Aim

VI Factors in IT.

Principle is work—rest—work.

### THE FOLLOWING ARE THE FUNDAMENTAL PRINCIPLES OF WEIGHT TRAINING

1. Never do weight training alone.
2. Always start weight training with a general warm-up.
3. Warm-up with weight using half of the weight (normally used) and take 10 repetitions.
4. Always have your purpose of weight training — Body building, Sport, Fitness etc.
5. All Isotonic movements do with slow speed.
6. Isometric exercise movements are held at the terminal positions for about 6 to 12 seconds.
7. Exercise both agonist and antagonist muscles to maintain body balance.
8. Exercise 3 days in a week (Monday—moderate workout, Wednesday—light workout, Friday—heavy workout).

9. Inhale deeply just prior to beginning a lift.
10. Never lift with your back muscles from the floor.
11. Use your thigh muscles to lift the weight from the floor (bending at the knee).
12. Light weight — more repetitions develop endurance.
13. Use explosive type of movements with moderate weight to develop power.
14. Exercise different muscle every time.
15. Exercise on sets; a set may include a few repetitions. Have 2 minutes rest between sets.
16. The progress is in either adding the load or increasing the repetition in each set.

A few exercise names are given for general development of the body.

1. Military Press
2. Two Arm Curl
3. Half Squat
4. Rowing Exercise
5. Rowing Exercise to the Sideward



6. Wrist Roll
7. Bench Press
8. Heel Raise
9. Sit up.

Scholish defines interval training can be of two kinds based on the intensity.

- i. e. a) intensive interval.  
b) Extensive interval.

This can be also classified based on duration short IT (8—12 sets) ; Median IT (2—8 mts) ; Long interval Training (8—20 mts)

## INTERVAL TRAINING :

The basic concepts of interval training are :

- a. Cover a distance shorter than the event distance at a fast i.e. in an aerobic pace.

It is a method of our loading the athlete by the use of anaerobic and aerobic excises, aiming to develop a high oxygen debt Capacity.

$\frac{1}{2}$  or  $\frac{3}{4}$  of the actual distance, distance at Competition speed or even faster needs a longer interval of slow jogging. (about 2 minuts)

In short IT; There are two walk outs :

- a) Pace endurance work out.
- b) Speed endurance work out.

In a) pace, distance, interval are kept constant.  
Only the NO of repetitions are increased.

In b) distance, interval and the NO of repetitions  
are fixed and pace varied as training advances.

- b. Rest until recovery is partially completed (active rest).
- c. Repeat the distance.

The Interval Training permits the athlete to achieve the greatest possible work load with the least amount of fatigue. This training is made up of five basic variables.

- a. The duration of the work interval.
- b. The intensity of activity during the work interval.
- c. The duration of the recovery interval.
- d. The intensity of activity during the recovery interval.
- e. The number of times the work intervals are repeated.

The Interval Training is designed to give precise amount of stimulus to the muscular, anerobic, aerobic, circulatory and respiratory systems.

### THE WORK IN INTERVAL TRAINING :

1. A specified distance to be run is prescribed.
2. A predetermined pace (i.e. the speed of the work) at which the athlete covers the set distance. This never to be maximal intensity-only near to maximal intensity say 170 beats per minute during work interval.
3. The recovery period during which the athlete work at a reduced rate of speed - i.e. Jog slowly/walk. This should be no longer than 2 minutes.
4. The length of exercise session to be 30 minutes only. The athlete works to the predetermined number of repetitions. The repetitions may be 10, if the work is short and recovery is long.

Interval Training is designed by its intensity not to exercise muscles much faster than you can supply them with oxygen. You never perform at maximum; i.e. you never go all out but you stay in that phase where you supply oxygen nearly as rapidly as you need it.

The circulo-respiratory endurance is dependant on the effectiveness of heart, blood vessels and lungs

which together capture oxygen and deliver it in the blood stream to the muscles. The functions are brought to their highest state of efficiency by Interval Training.

The progress in the training or workout is the total number of work unit per week should increase. Progressive overload is applied by increasing one variable while the other remain constant.

**AIM OF INTERVAL TRAINING :** The duration and intensity of the individual to coincide more closely with the duration and intensity of particular event. Start the programme 6 to 8 months early before competitions and alter at every 4 weeks interval. A mile runners, training in the mid season may as follow :

Distance to run ..... 200 metres  
 Rest Recovery ..... 2 minutes (jogging  
 or walking)  
 Repetitions ..... 8 minutes

#### **PACE OR SPEED FOR EVERY REPETITIONS**

1 Lap	...	31.5 seconds
2 Lap	...	31.0 ..
3 Lap	...	30.5 ..
4 Lap	...	30.0 ..
5 Lap	...	29.5 ..
6 Lap	...	29.0 ..
7 Lap	...	28.5 ..
8 Lap	...	28.0 ..



## **CIRCUIT TRAINING**

It is a preseason conditioning method. It is meant for developing muscular endurance and cardiorespiratory endurance. It is usually scheduled at the end of the daily work because of its exhaustive demand. This can be done with or without weight. A series of exercises at different station is performed in fixed time unit. The stations usually 6 to 10 number. Each station exercise is only for a particular muscle group.

The performer progresses from station to station exercising each muscle group at the given intensity and duration. Each muscle group is given a chance to rest while the other are being exercised.

Progression in training is accomplished by gradually increasing the number of circuits around the stations or reducing the time for a single circuit or increasing the number of repetitions at each station within the given time. Development of muscular endurance results from activities of low resistance and high frequency. Muscular strength is developed through heavy resistance and low frequency.

A target time is fixed. Usually an individual notes the time taken to complete three laps of circuit at maximal speed and then attempts to half this time by training. When the target time is reached the individual advances to a more difficult circuit; a 6 station circuit for overall development with weights is given below :

STATION	AREA OF MUSCLE	EXERCISE
1.	Thigh	Half Squat
2.	Fingers & fore arms	Wrist Rolling
3.	Abdomen	Sit-up with weight
4.	Back & Shoulder	Rowing
5.	Arm Muscles	Front Curl
6.	Leg	Heel Raise

### INTERVAL—CIRCUIT TRAINING

This is a combination of interval training and circuit training. This programme originated first in Scandinavia. It is intended to develop speed, strength, endurance and flexibility.

A circuit is set up with 8 or more stations. An irregular distance between stations are provided. The total circuit range from 1 mile to 5 miles depending on the type of athletes for whom it is organised. Each station has programme of exercise. The athlete should cover the distance between each station either by Jogging or running or sprinting. This depends on the distance to be covered. Like circuit training, a target time is fixed and the athlete to advance with principle of circuit training to complete the circuit. This develops the components of physical fitness developed through circuit and interval training methods.

## VITA PARCOURS

Switzerland used it for fitness. This is a modified interval circuit training. The circuit distance is  $\frac{1}{2}$  to 1 mile with 20 stations.

Activity begins with warm-up in the 1st station -increases in strenuousness and then relaxation exercises. Vita is a swiss insurance firm.

Parcours is the French word for track or circuit, Vita Parcours has become extremely popular over much of Western Europe and in United States. This suits all the age group for fitness training. In an effort to offer a broader range of activities, a parcour with some new addition are made at Sylvan Elementary School in North Carolina, U.S.A. The distance is  $1\frac{1}{4}$  mile. The Parcours is designed.

1. To promote fitness of the young,
2. To develop the ability to recognize and read signs.
3. To develop a better understanding of nature through the scientific identification of plants, trees, rocks, insects and small animals.
4. To provide pleasure : It only needs a small land, planning and work to develop a parcour.

The physical fitness trails include, crawling, squat thrust, pyramid climb, log hop, ladder climb, sit-ups.

fire walk swing, rope climb etc.

## CROSS COUNTRY RUNNING

First introduced in London in 1867 by the Thames Rowing Club. The purpose is to keep FIT. The first international championship was held in 1898 between England and France. In 1903, the International Cross Country Union was founded.

It is a conditioning programme for the middle and long distance runners. The aim of this running is to build endurance (Cardiorespiratory). The distance usually varies from 1 mile to 10 miles and more. Cross Country was first included in Olympics but omitted from the athletics programme after 1924.

Now, people of all ages run Cross Country for physical fitness. The athletes run cross country to build cardiorespiratory endurance with a steady pace running. This is meant to build pace Judgement.

## FARTLEK

This training method was first introduced in Sweden. This is a type of cross country running with Pace Variations. The term 'FARTLEK' means 'Speed Play'. A set time period is used as the basic factor.

The Runner starts off Cross Country running at an easy pace, then varies with short intensive sprints and with fast middle distance runs up to  $\frac{1}{2}$  mile in length. The



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interest In Fartlek is, it eliminates training boredom; delays the onset of fatigue and develops more stamina and strength.

In this training the runner does not learn pace judgement which is a weak point to it.

Another principle in fartlek is that the athlete should learn to work hard when he/she is tired. (A short sprint will follow a fast steady  $\frac{1}{2}$  mile running). The other important point is that an athlete runs in a varied conditions which demands more than normal (uphill, down hill, sandy, grass etc.)

## PRESSURE TRAINING

Practice of technique & skills under very high stress in terms of frequency, intensity is known as pressure training. An athlete learns to execute the skill much faster rate in this type of training.

1. Adaptability to a very high demand
2. Skill performance even in a high frequency

Example : A Goal Keeper in foot ball is trained with more than two balls at a time.

Skill stress - coordination - Reaction time speed-accuracy developments.

## RESISTANCE TRAINING

This method is usually adopted by the Physiotherapist to recondition or to bring back to normalcy of joint mobility in patients and injured athletes. This is based on the concept that an external force may be applied to the body levers to oppose the force of muscular contraction. Here, there are five factors which contribute to the development of muscular efficiency i.e power, endurance, volume, speed of contraction and co-ordination. Whenever an athlete faces any accident he/she is reconditioned by this training method first and then specific conditioning.

To develop power to a normal athlete, heavy equipments which give greater resistance may be used. This method may develop power, endurance, speed of contraction and co-ordination. (Example : Playing Badminton with Tennis racquet during training).

## RECENT TRAINING METHODS

The most recent training methods are Isokinetic and Plyometric.

**ISOKINETIC :** Isokinetic exercises allow the muscles to work at maximal force throughout the entire range of motion for each and every repetition, these by providing a greater training stimulus.

Increased muscular output produces increased resistance rather than increased acceleration. Moreover isokinetic allows maximal loading of any muscle

throughout the full range of motion rather than at a specific angle as in an isotonic exercise.

This is based upon the concept of loading the muscle maximally throughout the full range is the basis for an ordeal muscle test. This function is exercised on rated machines which is known as 'Isokinetic Machine'.

**PLYOMETRIC:** It is a concept of training that applies the specificity principle regarding the preset stretch condition of the muscle prior to explosive contraction.

(Example : Jumping down from a 30" table before we jump up. Jump up is an explosive contraction)  
—Jumping down— Preset stretch condition of the muscle.

# Ergogenic Aids

In modern time in the field of sports and games, some agents are used to improve performance. Such an agent to aid performance is classified as an **ERGOGENIC AID**. Ergogenic aid simply means any substance or means that improves physical performance through its effect on the body. Ergogenic means **WORK-PRODUCING**.

The substance may include :

- a. Drugs
- b. Food-stuff
- c. Vitamins
- d. Physical Stimulants such as electricity, thermal packs, hypnosis etc.

Substances that have some ergogenic properties have such deleterious physiological and psychological side effects that their use cannot be tolerated. Even **I.A.A.F.** has established antidoping regulations.

1. Psychomotor stimulants
2. Sympathomimetic amines

3. Central nervous system stimulants
4. Narcotic analgesics
5. Anabolic steroids.

Some of the ergogenic aids very commonly used are

- a. Amphetamine
- b. Anabolic Steroids
- c. Aspartates
- d. Hypnosis
- e. Oxygen Inhalation
- f. Blood Doping
- g. Negative Ionization.

**AMPHETAMINE :** This is synthetic alkaloid. It may be taken in the form of tablets or by means of inhales. It is a stimulant to central nervous system. It's effects are increased blood pressure, feeling of alertness, increased breathing rate, peppiness and euphoria. It also causes sleeplessness. It is an extremely dangerous drug

**ANABOLIC STEROIDS :** Androgenic hormones. are basically a product of the male testes. It stimulates male characteristics. It is dangerous to use this drug.

**ASPARATATES :** It is aspartic acid. It is one of the fundamental amino acids. It is used for abolition



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or reduction of fatigue at the neuromuscular level. Excess may cause health problems.

**HYPNOSIS :** Hypnosis has influence with strength and endurance. It has been used successfully in sports. It is dangerous when untrained personnel uses it.

**OXYGEN INHALATION :** This is a practice based on psychological effects than scientific evidence to influence the performance.

## **DOPING**

“Doping is the Administration of or the use by a competing athlete of any substance foreign to the body or of any physiological substance taken in abnormal quantity or taken by an abnormal route of entry into the body, with the sole intention of increasing in an artificial and unfair manner his performance in competition.”

—By Medical Commission of the International Olympic Committee.

**BLOOD-DOPING :** This is also known as blood reinjection. This needs more research evidence to support its effect. The present practice is 500 ml of blood is removed from an athlete before 3 weeks of a competition and reinjected on the day of competition.

**NEGATIVE IONIZATION** The negative ions in the blood stream speed up delivery of oxygen to the cells and tissues, that a euphoric feeling is induced. It appears to have little or no value as a means of improving physical performance.

# Type of Physical Exercise

physical exercises are classified based on the following.

1. Speed of execution of movement.
  2. Types of muscular contraction the muscle undergo
  3. Load on the muscle and range of movement.
1. Based on speed the exercise can be divided in to three.
    - a. Speed exercise.
    - b. Normal exercise.
    - c. Stretching exercise.

**SPEED EXERCISE:** Any exercise can be done faster than its normal speed. This will produce greater intensity of work within a short time. This may result in development of speed endurance to the exercised muscle or muscles groups.

**STRETCHING:** Exercises that are done with slow speed toward a/ terminal position and pose/position of the body is held for 6 seconds to 12 seconds or even to a few minutes depending on the exercise is known stretching Exercises.

2. Based on muscular contraction the exercise are called as Isotonic and Isometric Exercise.

**ISOMETRIC** In this type of exercise the size of the muscle dose not undergo a change during exercise. There is no limb movements but the muscle develop tension.

**ISOTONIC** Isotonic exercise simply means that the size of the muscle changes during exercise and results in limb movements.

3. The exercise based on the load range of movement is known as ISOKINETIC exercise. This type of exercise allow the muscles to work at maximal force throughout the entire range of motion.

## Effect of Exercises

The effect of exercise on our body is not permanent. In other words, any change due to the exercise is reversible if the exercise are discontinued. The changes are classified as Temporary and Chronic. Any change that disappears after a very short reasonable time is known as Temporary change. for example breathing due to exercise or pulse rate. Any change that may remain longer is known as Chronic change. For example muscle size due to weight training or capillaries due to endurance training.

Research evidence show the following improvements.  
**MUSCLE SYSTEM :**

1. Muscle size is developed due to the development in the muscle fibre.
2. There is a 45% increase in the number of open capillaries in the muscle.
3. An increased connective tissue growth results giving more stability.
4. Synthesis of Energy Stores increased (Myoglobin).

5. Synthesis of enzyme protein increased.

6. An increase in number of motor units in a task.

## **SKELETAL SYSTEM :**

Lack of optimum exercise will result in decomposition of calcium and phosphate.

## **CARDIO VASCULAR**

### **Heart Rate :**

1. Regular exercise increasing the heart rate to 140/m for a 10-15 minutes reduces the resting heart rate.
2. A trained long distance runner may have a resting heart rate of 40-50 beats per minute.
3. The recovery phase is faster in trained athlete.
4. As the result of training the heart increases in size because of heart muscle hypertrophy.
5. The heart increases its contractility - that is its ability to squeeze more blood from the Ventricles.
6. The stroke volume out put of the heart increases

	Normal man	Athlete
Stroke Volume	116 milli	161 milli
Maximal	litre	litre



7. Cardiac out put :

Rest	5040	5500
Maximal	22,400	28,800

8. The blood volume increases in trained athletes. This is a result of increased plasma volume.
9. The athlete is usually able to work longer with high levels of lactic acid in his blood than non athlete,
10. Exercises lower blood fat levels.

## RESPIRATION

1. Resting Ventilation rates from 12 - 16 cycles/minute to 10 12 cycles/minute
2. Increases the tidal volume (The amount of air taken in with which each breath) from 500 milli litre/minute to about 550/600 milli litre/minute.
3. The capacity to utilize oxygen is a result of the functional capacity of the heart, lungs, circulatory system, blood and enzyme.
4. Greater depth of respiration during maximal exercise due to the greater strength of the respiration muscles of the rib cage.
5. Oxygen dept capacity may be increased.

## **DIGESTIVE AND EXCRETORY SYSTEM**

1. The nerves and muscles of the stomach and intestines become well toned.
2. Hunger can improve digestion.
3. Exercise increases hunger.

## **NERVOUS SYSTEM**

1. Muscles are controlled by the nerves.
2. Exercise enhance muscle-nerve co-ordination.
3. Motor path way are established.
4. Dynamogenic effect of Exereise also occurs during rehabilitation.

## **ENDOCRINE SYSTEM**

1. The hormones produced by the adrenal medulla are responsible.
2. For the release of more energy by the organism They increase the heart rate for action.

## **BODY TEMPERATURE**

1. Increased muscular activity generates more body heat.
2. Sweating is the prime body mechnism for the dissipation of heat.

## **WOMEN :**

1. Women are more susceptible to athletic injuries because of their anatomy.
2. Athletic women have quick and easy births.
3. Women can participate in training.
4. Programmes that increase their abdominal strength and circulation.

## **NUTRITION / ATHLETIC DIET**

Carbohydrate and fat constitute the Major fuels for muscular activity. Proteins, Vitamins, Minerals and water are essential for the diet and Maintenance of health. Carbohydrates Pre-game Meal, does favour long-term activities in terms of efficiency and performance. Body weight reduction is effective through Cardiorespiratory endurance exercise and diet Control Programme.

## **REQUIREMENTS OF ATHLETIC DIET**

- |                  |             |
|------------------|-------------|
| 1. Carbohydrates | 2. Fats     |
| 3. Proteins      | 4. Vitamins |
| 5. Minerals      | 6. Water.   |

It is generally agreed that an adult needs a Carbohydrates — 50% to 55% ; Fat 25% to 30% : Protein 12% to 20% plus adequate Vitamin, Mineral and water for balancing the metabolic requirements.

# **ESSENTIAL FOOD GROUPS :**

## **1. MILK GROUP :**

Milk and its Products Supply : Calcium, Protein, fat and Vitamin D and B<sub>2</sub>.

## **2. MEAT GROUP**

All meats, fishes, eggs, cheese etc. Supply : Major Source of Protein, Vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>5</sub>, B<sub>7</sub>, B<sub>9</sub>, B<sub>12</sub> & D Choline and iron—Minerals Also Seafood Supply iodine & Liver—Vitamin A.

## **3. VEGETABLE GROUP**

All type, dark green and deep Yellow Supply : Vitamins A, B<sub>9</sub>, C, E and K. Minerals iron, Sodium, Potassium and Magnesium. They also form a source of Carbohydrate energy.

## **4. FRUIT GROUP**

Provide Vitamin-C and Vitamin A. Minerals sodium, Potassium & Magnesium. Fruits also provide Carbohydrate energy.

## **5. BREAD GROUP**

All cereals, beans and breads etc. Carbohydrate energy Sources, they do supply Protein, Vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>5</sub>, B<sub>6</sub>, K, Choline and Minerals Sodium, Potassium, Magnesium and iron.

## 6. FAT GROUP

Ghee, Vils, Cheese etc. They help to Metabolize Certain Vitamins such as A, D, E and K. Provide fuel for muscular activity.

## 7. SUGAR GROUP

Sugar, Jellies, honey, Syrup Carbohydrate beverege and hard Candy—Carbohydrate energy supplier.

### HINTS ON ATHLETIC MEAL :

1. Minimum Number of meals that a person should have each day is Three (3). With respect to physical performance, 5 small meals a day is superior to 3 normal or regular meals; and 3 regular meals is superior to 2 large size meal in a day.
2. Daily meal requirements depends upon age, sex, size of the body, their physical fitness condition, health aspects and physical activities.
3. Whether you take 5 meals or 3 meals or 2 meals a day, it should be based on the calories requirements of an individual.
4. The Last meal prior to an athletic meet or game to be taken 3 or more hours before the competition.
5. The pre-game meal must be light and easy to digest (More of Carbohydrate foodstuff than fatty foods).



6. Athletes who are taking part in activity that last for more than 30 minutes, should consume a pre-game meal made up of Carbohydrates.

## REASONS

- a. Carbohydrates are able to digest quicker than fats or Proteins.
- b. Carbohydrate food stuff is converted as an energy source with the least amount of effort.
- c. Normal blood plasma glucose level can be maintained.
- d. Will increase the stored Carbohydrate in the muscle and liver and therefore allow the athlete to exercise longer.
- e. Most recently, liquid meal is prepared as pre-game meal.
- f. Because of Psychological effects pre-game meal choice must be given to the athletes.

## WATER AND MINERAL BALANCE

During prolonged physical exertions, athletes dehydrate too much, therefore they may suffer some heat injury if care is not taken properly.

- (i) due to dehydration, heat cramps heat exhaustion and heat stroke may happen. therefore,

- (ii) during game, every 15 minutes, about 200 ml water with a bit of salt can be taken which will compensate the minerals and water.
- (iii) Because of this athlete may continue to perform without unnecessary heat injuries.
- (iv) At the end of each game, electrolite soft drinks (cool) can be taken.
- (v) Cold and Soft drinks / water preparable than hot drinks.

# Fatigue

**Definition :-** State of decreased capacity for work due to previous work load.

“Loss of use owing of use”.

Fatigue can be classified as General, physical & mental.

Physical fatigue can also be said as local fatigue because the muscle is unable to cope with the stress.

## REASONS FOR FATIGUE :

1. Prolonged use of Muscle
2. Mental disturbance
3. Disease Condition
4. Worries
5. Boredom etc.

## SYMPTOMS OF FATIGUE SETTING

1. Loss of judgement
2. Slow reaction time

3. accidents
4. Breakdown etc.

## **SITE OF MUSCULAR FATIGUE**

The possible site of muscular fatigue is the neuromyosin or neuromuscular Junction. Physiological reason for Fatigue (local) accumulation of Lactic acid. FT muscles are more prone to muscular fatigue in slow Twitch muscle fatigue may set in due to (1) depletion of muscle glycogen (2) dehydration (3) loss in body electrolytes (4) boredom mental & emotional Fatigue are due to prolonged mental activity.

**TRAINING :** Postpones the on set of Fatigue by increasing pain tolerance thruths hold.

# Mental Health

Mental health is nothing but the preservation of the intellectual, emotional, intestinal and physical health of the children. Mental health and physical health act and react on each other. The mind cannot be sound unless the body is sound, and the body is adversely affected if there are mental tensions and disequilibrium. Hence a good mental health is to assist every individual in the attainment of fuller, happier, more harmonious and more effective existence.

Crow and Crow defines "Mental health is the preservation of the intellectual, emotional, intestinal and physical health of the children."

## THE OBJECTIVES OF MENTAL HEALTH

- 1) Prevention of personality amplications.
- 2) Safeguarding the mental health of the individual.
- 3) Treatment and cure of mental ailments and defects.



## FACTORS CONTRIBUTING TO HEALTHY MIND

### 1) ADEQUATE FEELINGS OF SECURITY :-

Adequate feelings of security are essential for the growth and development of well integrated personality. Physical security is indispensable for life. Feeling of security means to feel at home. The mentally healthy individual radiates poise and emotional confidence. The first duty of home is to educate the child in acquiring emotional security.

### 2) ADEQUATE FEELINGS OF PERSONAL WORTH :-

Every body is gifted with some talents' lustre, qualities and assets. This personal worth of an individual must be recognised by himself. He should explore himself to know it, it would be natural and normal to feel proud over such qualities. This aids one's self-confidence which is an important factor in each and every success. without adequate feelings of personal worth. the child will feel himself belittled. It will make him small in his own eyes. Thus he will leave feeling of inferiority and be victim of neurotic conflicts and indecision.

### 3) ADEQUATE UNDERSTANDING OF SELF :-

It is very easy to know about others, but it is very difficult to know one's ownself. Some times, we deceive ourselves. Self knowledge is a great knowledge. In order to achieve self realisation which is one of the most important and fundamental aims of education, knowledge of one's ownself helps a lot in way of adjustment. It serves a great purpose in rationalization. It resolves

and prevents the conflicts and aids to meet the challenge of life situations with great force and insight.

#### 4) ADEQUATE UNDERSTANDING OF OTHERS :-

We do not live alone. Man is a social animal. In order to have healthy adjustment with social environment or with other persons there is need to understand others. Adjustment needs two objects i.e. self and others. Unless we know as to what is not of interest, aptitude, temper, temperament, attitude and value others have, we may not be able to make adjustment with others, therefore, knowledge and understanding of other people is very much needed for good mental hygiene.

#### 5) EMOTIONAL MATURITY :-

A good personality is always emotionally mature. He does not go on extremes and is not very sensitive. He is not a tool in the hands of his emotions but emotions are under control.

#### 6) ADEQUATE BASIC HARMONY :-

A person achieves fundamental harmony with his environment when his own ambitions do not conflict with his ability to satisfy them or with rights and desires of others.

#### 7) Adequate integration of Personality :-

8) Desirable attitude towards life.

9) Self-confidence.

- 10) Achieving most of the aims and setting satisfaction in many activities.
- 11) Sound philosophy of life.
- 12) Usually achieving the goals that one seeks.
- 13) Social efficiency.
- 14) Normal desire to work or to play.
- 15) Beneficial habit patterns and a good nervous system.

**Role of Teacher in promoting Mental Health of the individual / Techniques and Programmes useful for Mental Health.**

**A) TECHNIQUES USEFUL FOR MENTAL HEALTH :**

- 1) By adopting sympathetic and friendly attitude to infuse a sense of security in the school children.
- 2) By providing as much freedom as possible in the choice of an organising their own selected activities.
- 3) By developing good ideals to have faith of the individual spiritual life.
- 4) By guidance during infancy for the prevention of emotional trauma.

- 5) By sublimation of sex-instinct through creative and ideal work.
- 6) By giving his pupils various opportunities of self-expression, self reliance, by cheerfulness, by his sense of humour and by avoiding mental conflicts.
- 7) By various efforts in the direction of adjustment of the pupils in different fields of life.
- 8) By securing pupils co-operation in their daily lesson.
- 9) By realising them to have respect for others personality.
- 10) By providing health education at the appropriate time.

#### **B) PROGRAMMES USEFUL FOR MENTAL HEALTH**

- 1) Organisation of play, games and recreation.
- 2) Arranging social functions in the school.
- 3) By creating congenial environment.
- 4) Provision of educational and vocational guidance.
- 5) By developing self-confidence and self control among the school going children.

# Public Health Measures to Combat Infection

## INTRODUCTION :

Health is the state of well being. Health education motivates the person to take the information and do something with it to keep himself healthier by avoiding actions that are harmful and by forming habits that are beneficial.

Health measures is taken to engage people activity in programmes and services which are organised for the solution of health problems, that is to help to learn to do things themselves for their own health improvement.

Health is very important in the betterment of human relation ship, particularly from the stand point of health. To improve healthy relationships there should be Co-operation and Co-ordination amongst the health services and health practices.

For Combat infection, the education about health Should start right from Childhood, Through this education that helps the Child to attain healthy habits an attitudes.

## INFECTION:-

Infectious disease continue to dominate the health scene in the less developed parts of the world. Recently in



more educated countries, incidence of communicable disease have shown dramatic fall in the last 50 years.

### CAUSES :-

Each infections disease is caused by a distinct type of germ and virus which is too small to be seen with human eye, but can be seen with the help of a powerful microscope. An Infection disease becomes a community problem because its prevention and control require the team work of health workers and community.

To avoid this, safety measures should be taken like having immunisation antimicrobial chemotherapy, improved nutrition and better sanitation.

### INFECTION IS FIGHT WITH THE BODY

Body produces antibodies and antitoxins in the blood. The antibodies are gamma globulin a type of protein which renders the invaders in the body helpless. For (eg) by causing them to clump together. So that they can be dealt more easily by second defence mechanism. The antitoxins neutralise the poisons produced by the invaders.

The mechanism is provided by the white cells in blood which are of different types. some of which swallow up and destroy the germs. Their fight can be very easily compared with fight between two forces on a boundary line of two countries. If it is of recent origin it is the polymorphs in blood. If it tends to become chronic or long duration lymphocytes jumps in lymphocytes increases in tuberculosis., malaria and syphilis Eosinophils increase in asthma (allergic condition worm infection and skin

disease). Where as monocytes increase in T.B, malaria and brucellosis. Anti bodies are anti-toxins can be transformed from one individual to another and are used in medicine to prevent and cure infection. This is known as immunisation which can be active as well as passive,

### PREVENTIVE MEASURES :-

Infectious disease are those which spread from one person or from source to the other but without the direct knowledge of the person who is suffering from it,

The mode of transmissions mainly through water, air and by contacts or by animals.

### PROTECTED WATER SUPPLY :-

The water which we use either for bathing purpose or drinking purpose should be very clean. The water source should be checked. That source should be closed, if water should be chlorinated. The reservoirs should be cleaned and should be properly and periodically cleaned. Moreover, the pipe lines through which the water supply is done should be very clean and out of rust. Above all, the water which we drink should be boiled.

## 2. ENVIRONMENTAL SANITATIONS

This is one of the very important combat-measures of infection of air. As the disposal of carcases should be done properly, so that the pollution of air is avoided, Disposal of human waste products, and death bodies If industrial wastage should be done properly. Disposal of hospital waste must be done. If, public should be aware of these things and they should enter their co-operation in this so that we may avoid the environmental pollution.