UNIT 10

TRAINING AND DOPING IN SPORTS

Content

Learning Outcomes

You will

- understand the concept and principles of sports training.
- summarise training load and its concept.
- understand the concept of warming up & limbering down in sports training and their types, method & importance.
- acquire the ability to differentiate between the skill, technique, tactics & strategies in sports training.
- interpret concept of doping.

Discussion					
Do you follow a fitness routine? Complete the given training and share your information within your group. After discussion, is there anything you would like to change? If so, why/why not?					
Personal Details					
Name		Age		Gender	
Physical Fitness Goals					
What are your short-term physical fitness goals? (3 months)		What are your medium-term physical fitness goals? (6 months)		What are your long-term physical fitness goals? (a year)	
Your Current Lifestyle/state					
How would you describe your current level of fitness?	Unfit	Below Average	Average	Good	Very Good
How important is an exercise to you?	Not all important	Slightly important	Moderately important	Very important	Extremely important
How often do you exercise?	1-2 times a week	2-3 times a week	3-4 times a week	4-5 times a week	Everyday
What barriers, if any, prevent you from exercising more regularly?	I don't have enough time	I can't stay motivated	I have an injury	I don't enjoy exercising	I exercise regularly with no barriers
Would you say you eat a healthy balanced diet?	Not really	Sometimes	Fairly often	Often	Always

10.1.1 Introduction

Sports performance training is the training of the body and mind to prepare the athlete for the rigors of a specific sport. It differs from personal training in that the athlete is conditioned and appropriately prepared to compete in her/his sport of choice, rather than broader general fitness. Individual characteristics such as age, gender, and fitness levels are combined with scientifically proven training methods

and exercises to create a customized, sports-specific workout plan that results in a more confident, motivated athlete. The focus is to enhance the athlete's performance in competition by using the latest advancements in sports science and kinesiology to develop a sport-specific strength and conditioning programme that improves the athlete's overall athleticism – strength, agility, speed, power, coordination, and balance as it relates to the sport in which they compete. For example, a volleyball player involved in sports performance training will perform exercises that mimic the movement patterns required on the volleyball court. She will focus on reaction, balance, vertical leap, agility, and high-intensity interval training. By modelling her training around the demands of her sport, she will develop the specific abilities needed to excel in competition.

Do you know?

The preparations of an ancient Olympic athlete started many months, even years, before the opening of the festival, in the gymnasium. The Ancient Greek gymnasium was a public location used for training, education, exercise, and socializing – something like the modern community centre. In Ancient Greek society, achieving a harmonious balance between body and mind was an essential aspect of an individual's personal development. Therefore, the gymnasium hosted wrestling matches and provided weight lifting training as well as music rehearsals and philosophy lectures.

10.1.2 Meaning and Concept of Sports Training

Training for achieving something in a competition is not a new idea. With the passage of time, more time and effort is being devoted to training and preparation for competitions. For example: Invention of new techniques in the field of athletics and weight training methods has shown very encouraging results. Training for any game or event has become very technical, and a scientific approach is needed to get the desired results.

Sports training is based on specific individual care, improved fitness, scientific ways, psychological feedback, technical help, sound machines and apparatus, climate, diet, safety precautions, etc. Training methods are based upon scientific principles in a systematic order. Thus, the training helps develop fundamental skills, advanced skills, techniques, tactics, strategies, emotional stability during the competition, motivational forces, etc. It gives the trainee practical and theoretical knowledge regarding performance, and it also guides her/him on how to improve further in different ways. We can say that these are methods to improve general and specific performance in games and sports. The following definitions may be helpful in understanding the meaning of sports training.

Definition

"Sports training is the basic form of preparation of sportsmen."

'Mathew'

"Sports training is a pedagogical (educational) process, based on scientific principles to prepare sportsmen for higher performances in sports competition."

'Hardyal Singh'

"Sports training is based on scientific knowledge and a pedagogical process of sports perfection which through systematic effect on psycho-physical performance ability and performance readiness aims at leading a sportsman to top level of performance."

"Harre"

"Sports training is the basic form of an athlete's training. It is the preparation systematically organized with the help of exercises, which in fact is a pedagogically organized process of controlling an athlete's development."

"Matveyev"

"Sports training is a planned and controlled process in which, for achieving a goal, changes in complex sports and motor performance ability to act and behaviour are made through measures of content methods and organisation."

"Martin"

"Sports training is a scientific-based and pedagogically organized process through which planned and systematic effect on performance ability and performance readiness aim at sports perfection and performance improvement as well as at the contest in sports competition."

"G. Thiess and G. Schnabel"

"Sports training is a targeted approach to training focused on your sport of choice."

"Todd Townes"

"Sports training is training designed specifically to increase performance and minimize injury of general sports performance as well as specialized sports performance.

"P. Garrison"

Extension Activity

Sports training is the process of preparing athletes for a specific competition. This preparation needs long-term planning, which includes:

- Conditioning training (strength training, endurance training, flexibility training)
- Training of technique (Technical preparation)
- Training of tactics (Tactical preparation)
- Psychological training (Mental preparation)

Working in groups, interview five sportspersons from different school teams participating in CBSE's Zonal Competitions (or any equivalent Competition). Find out details of their training under the heads given above.

10.1.3 Principles of Sports Training

For formulation, implementation, and development of players and guidelines for coaches, certain principles of sports training are followed, which are given below:

a) **Principle of Continuity:** Training should be a continuous process. There should not be any breaks. It should be a regular phenomenon. If there are long intervals between training sessions, an individual's fitness decreases, and the human body adapts to reduced load.

b) **Principle of progression load and overloading:** The principle of overload states that there should be greater than the average load on the body as required for training adaptation. It means that the training load should be increased to improve the performance of sportspersons. The load should be given carefully. If more load is given to the trainee constantly, performance may decline.

c) **Principle of Specificity of Training:** General and specific training are equally important to improve performance. Initially, general training should be given to developing all components of fitness and later on the proportion of specific training should be increased gradually. For example, speed improved through running will also benefit football. All athletes need general fitness development, but throwers need more strength training.

d) Principle of uniformity: Firstly, training is uniform to all players. But training should have an individualistic approach with time. A coach should take into consideration the following points:

   i. Sex

   ii. Age

iii. Psychological difference

iv. Training level

e) **Principle of periodization:** It prepares the sportsperson to give their best performance in a particular competition. It has three phases:

- Macro-cycle,
- Meso-cycle and
- Micro-cycle.

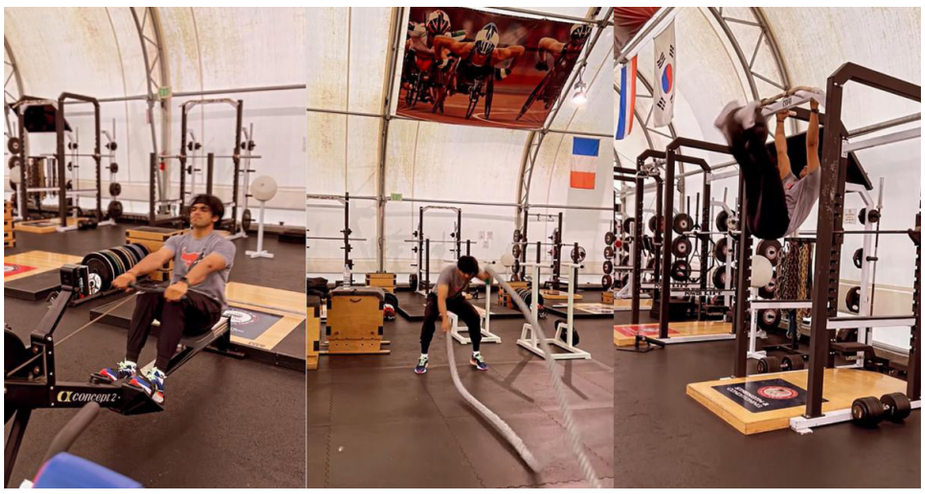
Macro Cycle: Duration of three months to one year. The last macrocycle should be aimed at recovery and relaxation.

Meso Cycle: Duration of three to six weeks. Here also, the last cycle should be aimed at recovery.

Micro Cycle: Duration of three to ten days. The last training session should aim at recovery and relaxation.

f) **Principle of Warming up and Limbering Down:** Warming up is a must before any training session as it prevents muscle soreness and injury. After the training session, gradual cooling down or limbering is also essential for returning to the normal level.

g) **Principle of Active Participation:** Active participation means the player should follow the principle of the law of readiness, which is very significant for getting good results in various levels of competition. The player and teacher should participate actively.



h) **Principle of Variety:** Training is a long-term process, and load and recovery can become boring for both the athlete and the coach. So, a successful coach should plan variety in the training programme to maintain the interest and

motivation of the athlete. Sometimes, change and variety may be achieved by changing the nature of the exercise, time of the day of the session, training group, and the environment.

i) **Principle of Ensuring Result:** The apex aim of sports training is to attain good results. It can be said that sports training aims to enable the sportsperson to put up a better performance in the competition. This principle cannot be achieved without the implementation of other principles. So, stress should be laid on the implementation of the other principles by the coach.

j) **Principle of Rest and Recovery:** The training programs should be designed in a way that there is proper rest and interest in the training activities because the body regenerates during rest and becomes better and stronger than before.

I. **Tick the correct options**

1. In order to develop the best performance of an athlete in competition, sports training has become
   a. scientific and systematic
   b. disorganized and irrational
   c. complex and painstaking
   d. easy and approximate
2. The main benefit of systematic and scientific sports training is an increase in
   a. performance
   b. injuries
   c. physical labour
   d. supervision
3. 'Micro-cycle' involves training of
   a. One week
   b. 1-2 weeks
   c. 6-8 weeks
   d. 8-10 weeks
4. According to the Principle of Continuity, a training program should be
   a. regular
   b. irregular

c. once a week

d. once a month

5. The systematic planning of athletic or physical training is called

a. periodization

b. specificity.

c. frequency.

d. variance.

6. Which of the following is not a principle of sports training?

a. Principle of specificity

b. Principle of overload

c. Principle of continuity

d. Principle of rest

II. **Answer the following questions briefly.**

1. What do you understand by the term sports training?

2. What is the need for sports training?

3. What do you understand by the Principle of Meso-cyclicity?

4. List the phases of the principle of periodization.

5. What do you mean by the progression of load?

6. Differentiate between general and specific preparation.

III. **Answer the following questions in 150-200 words.**

1. In what ways does sports training become an essential part of a trainee's life in sports?

2. Why is systematic sports training required for an athlete?

3. Apart from training, list the factors, that contribute to a successful plan?

4. "Scenario of sports training is changing day by day." Justify the statement.

5. All players diligently follow the principles of training. Specify the factors that should be kept in mind while preparing a training plan.

Extension Activity

For a month, every day in the morning you/all will do 30 minutes of physical activity, in which you will follow the schedule designed by your sports teacher. At the end of every week mark, the principle of sports training is applied in the training program:

List the Principles of training that you applied to improve your performance

1.

2.

3.

4.

5.

6.

7.

8.

10.2.1 Training Load: Over Load, Adaptation, and Recovery

The sports training process involves activities and movements, leading to fatigue. Fatigue is the direct product of load caused by physical activity or exercise. Fatigue is essential for improving the performance capacity of a sportsperson. Training load, therefore, is of central importance in sports training. Load, overload, and recovery are critical issues for team physicians treating and caring for athletes.

10.2.2 Training Load

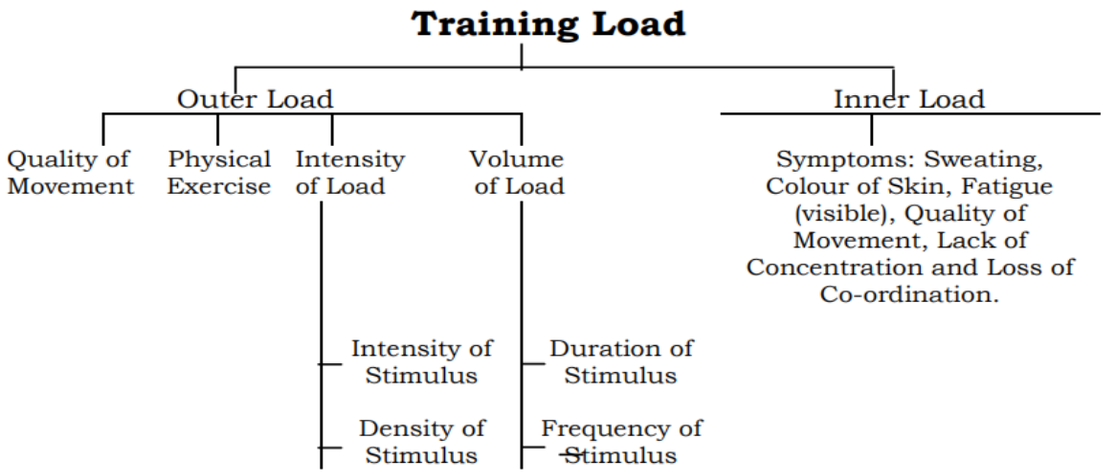
Physiological and psychological demands are placed on the individual through motor stimulus (movement), resulting in improvement and maintenance of performance capacity. Training load is of two types, namely

- Outer load and
- Inner load

Load is an inevitable result of athletic conditioning, training, and competition. Load inactivity may be a stimulus experienced and responded to by an individual before, during, or after participation. Load creates a demand or stress (both physiological

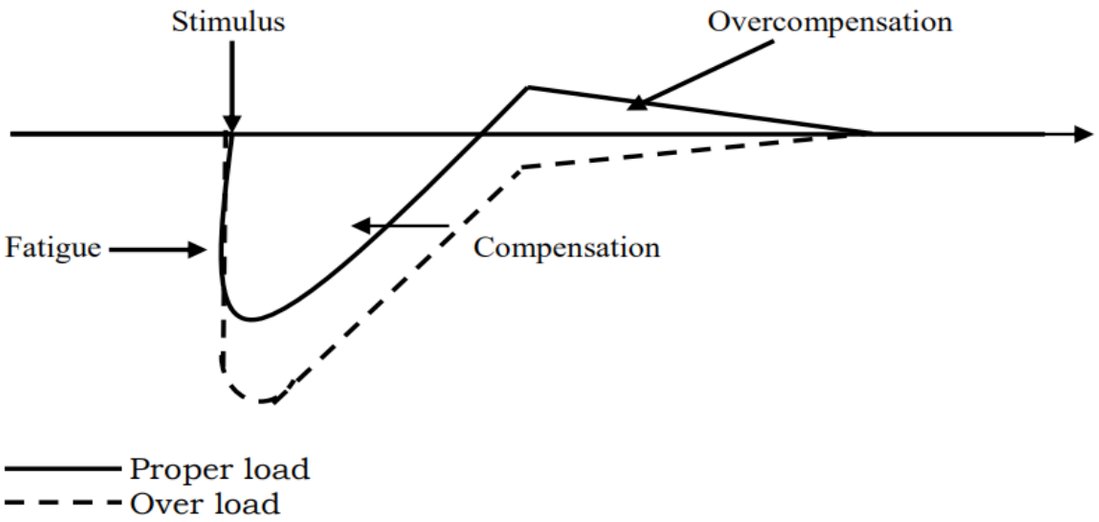
and psychological) and has internal and external components. Load that is safely managed may improve athletic capacity and performance and reduce risk of injury and illness.

The following figure will provide a complete concept of various features of training load.



10.2.3 Overload

The normal development of the training state of a sportsperson is disturbed when the physical and psychic daily load of life exceeds the loading capacity of the individual. Overloads, administered over a more extended period, lead to decreased performance capacity. Modern sports scientists consider the overloading phenomenon a disturbance in regular nervous activity. Performance in sports is not only a matter of muscular metabolic efficiency but it also, to a large extent, depends upon the efficiency of the nervous system. When the nervous system is disturbed, optimum energy and metabolic process utilization also gets disturbed. The other body systems can also not perform to the best of their efficiency. An excessive training load causes incomplete adaptation, and the sportsperson will have problems recovering from the training stimulus. These problems with recovery can also be cumulative. They occur when the loading is repeatedly too tremendous or too closely spaced. The decline in performance caused by incomplete adaptation is one of the most apparent symptoms of overtraining. In this situation, the coach must allow time for proper recovery and should evaluate and reduce the training loads used.



Thus, we can say that overload is a load that is excessive or a load that is not well managed. It will result in anatomical, physiological, and psychosocial conditions that manifest in altered performance, injury, and illness. Identifying and modifying load and minimizing overload have been advocated as central parts of optimal performance and injury and illness and prevention strategies.

The definition of overload chosen by the coach depends upon the particular physical characteristics that need to be developed.

- **Strength:** overload is increasing the resistance in terms of kilogram, etc.
- **Strength endurance:** overload is increasing repetitions of activity with a resistance ranging from the athlete's own bodyweight to adding weighted belts, etc. to the athlete, to light and sub-maximal loads. The lactic anaerobic energy pathway has high involvement.
- **Aerobic/heart endurance:** overload is increasing the amount of time that the person can continue a low strength demand in a steady state of work of low-intensity repetitions. The aerobic energy pathway is involved exclusively.
- **Speed endurance:** overload is increasing the number of high-quality repetitions of an exercise per unit of time; or increasing the quality of repetition while keeping the number at or above a fixed threshold; although this may take place in a climate of the cumulative lactic anaerobic pathway by-products, the alactic energy pathway has critical high involvement.
- **Speed:** overload is performing (and or selecting) a given task faster.

- **Elastic strength/power:** overload is increasing the resistance without loss of speed, or increasing the speed of moving a fixed sub-max ▫ max resistance.
- **Mobility:** overload is taking effective joint action beyond its present limit.

Overloading is of two types.

a) **Dominance of excitation process:** This state occurs when the training load suddenly increases without adequate preparation.

b) **Dominance of relaxation process:** This state results when an overdose of training load is administered continuously over an extended period.

Causes of Overloading

The main cause which leads to overloading can be discussed under the following four categories:

1. Faulty Training Method

(a) The recovery process may be neglected.

(b) There may be a rapid increase in the training load thus adaptation does not take place.

(c) There is a high volume of load with maximum or sub-maximum intensity.

(d) There is forced technical training involving complicated movements without adequate rest.

(e) There may be excess of competition with high demands.

(f) The training may be one-sided.

2. Life Factors

(a) The player may have had an insufficient night's rest.

(b) The player's daily routine is irregular.

(c) The player may have a luxurious daily routine.

(d) There may be an indulgence in alcohol and nicotine on part of the player.

(e) Bad living conditions of the player may be responsible.

(f) The player's leisure time activity is faulty.

(g) There is a quarrel in the family or the community.

3. Social Factors

(a) There could be excess of engagements.

(b) Friction in the family could also be a reason for overload.

(c) If the sportsperson is unsatisfied in her/his profession or studies, it may lead to overload.

(d) A misunderstanding with colleagues could also be a reason.

(e) Overloading in professional work, studies etc. could also be a reason.

(f) The family could have an unfriendly attitude towards sports.

(g) Excess of entertainment programmes could be a reason.

4. Health Factors

The sportsperson could be suffering from any/either of the following.

(a) Fever

(b) Bad stomach

(c) Infectious disease

(d) Injuries

Symptoms of Overload

The symptoms of overload are grouped as follows and they also appear in the same order:

1. Psychological symptoms

(a) Increased excitability.

(b) Tendency toward hysteria.

(c) Becoming quarrelsome.

(d) Less contact with the coach.

(e) Increased sensitivity towards criticism.

(f) Depression.

(g) Indifference.

(h) Loss of confidence.

(i) Loss of motivation.

2. **Performance Symptoms**

(a) Increased error in technique.

(b) Decreased concentration.

(c) Decreased differentiation ability.

(d) Decrease in strength, speed, and endurance abilities.

(e) Slow recovery.

(f) Decreased competition readiness.

(g) Increased tendency to surrender to competition.

(h) Uncontrolled behaviour in competition.

3. **Somatic-Functional Symptoms**

(a) Loss of sleep.

(b) Loss of appetite.

(c) Loss of weight.

(d) Disturbance in digestion.

(e) Frequent giddiness.

(f) Susceptibility to injuries.

Do you know?

Training monitoring is about keeping track of what athletes accomplish in training, for the purpose of improving the interaction between coach and athlete. Over history, there have been several basic schemes of training monitoring. However, the difficulty in standardizing the conditions of training made this process unreliable. With time, the measurement of heart rate (HR) evolved from interval training toward index workouts, where the main monitored parameter was the average time required to complete index workouts. These measures of training load focused on the external training load, and what the athlete could actually do. With the advancement in the scientific community, HR, lactate, VO2, and power output, were used to monitor training loads in athletes of differing abilities. These methods often require laboratory testing for calibration and tend to produce too much information, in too slow a time frame, to be optimally useful to coaches. The TRIMP concept which was mathematically complex was also introduced. Nowadays wearable sensors are used which provide high-resolution data of the external training load. These methods are promising, but problems relative to information overload and turnaround time for coaches remain to be solved.

Extension Activity

Join team practice sessions and start preparing for an Annual Zonal Competition for this year Scale your level of exertion experienced by you in the Rating of Perceived Exertion below every day after the session for 15 days

Scale	Experience (Exertion)	✓
0	Nothing at all	
0.5	Very, very slight just noticeable	
1	Very slight	
2	Slight	
3	Moderate	
4	Somewhat severe	
5	Severe	
6-7	Very severe very severe	
8-9	Very, very severe	
10	Maximum	

I. **Tick the correct options**

1. Outer load in training depends on
   a. sweating
   b. colour of skin
   c. the intensity of load.
   d. fatigue
2. Intensity of load, Volume of load, Physical Exercise are features of
   a. outer load.
   b. intensity.
   c. inner load.
   d. recovery
3. Cause of Overload in training is associated with.
   a. intensity
   b. frequency
   c. duration
   d. faulty training method

4. Overload in sports training relates to when

   a. oxygen is adequate to meet the needs of the body.

   b. the oxygen-supplying mechanisms are not able to increase.

   c. the intake of oxygen is insufficient to meet the demand.

   d. the supply of oxygen is more than required.

II. **Answer the following questions briefly.**

1. What do you mean by training load?

2. List the causes of training overload?

III. **Answer the following questions in 150-200 words.**

Explain overload in training and draw a flow chart of symptoms of overload?

10.2.4 Adaptation

In a literal sense, the word adaptation means to get adjusted. The human organism can get modified (adapted) to the environment, and as the environmental conditions change, the human organism also changes in due course. This adaptation process is also applicable to sports training—the human organism can modify to a new state of performance efficiency due to the administration of external load. Thus, load and adaptation go side by side. This adaptation process is biochemical and applies to improving conditional abilities (strength, speed endurance) only. As the sportsperson is exposed to the training and competition demands, this results in a disturbance of the homeostasis (internal body balance). The sportsperson makes an effort to restore the state of homeostasis by causing the different systems and bodily functions to adjust to the state of disturbance. In case the bodily homeostasis is disturbed again and again for a certain period, the human body responds by causing structural and metabolic changes, enabling the body to withstand the load more efficiently. This is called adaptation.

The following three conditions are to be fulfilled for adaptation to the training load.

1. Training load has to be as per the loading capacity of the sportsperson.
2. Recovery period should be in proportion to the training load.
3. Loading and recovery process must be repeated for a certain period (10 to 20 days).

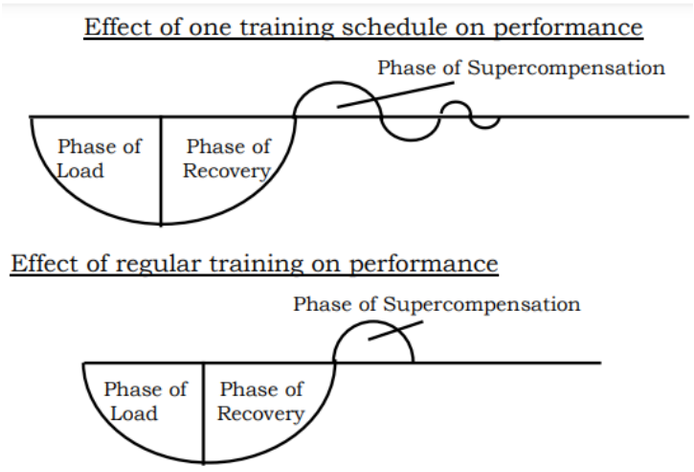


Fig. 3. Adaptation to training loads

Fig.4. Procedure of increasing training load

Conditions of Adaptation

To ensure the effectiveness of the training load in each training unit, the following conditions of adaptation are to be strictly adhered to:

a) Adaptation is maximum when the training load is given on an individual performance basis. To enable a sportsperson to have optimal benefit from training, the limitations shall be administered keeping in mind the specific character of an individual.

b) There should be a correct proportion between intensity and volume of training load. The intensity of stimulus has an inverse relationship with the volume of stimulus.

c) The adaptation process results from the correct proportion between phases of load and recovery.

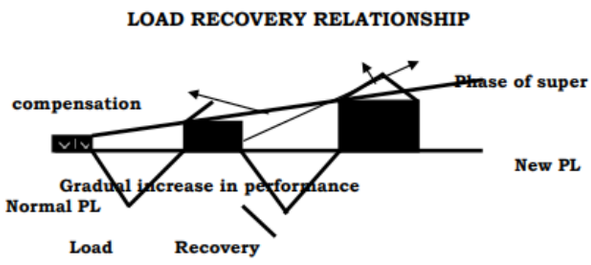
Recovery

Both training and competition loads enhance sports performance. In the long-term training process, the quantum of load is gradually increased, leading to improved performance. A beginner adapts to training load faster, whereas, with the increase in training age, higher loads are administered, resulting in slower growth in performance. Sportspersons cannot effectively undertake very high loads of training unless proper

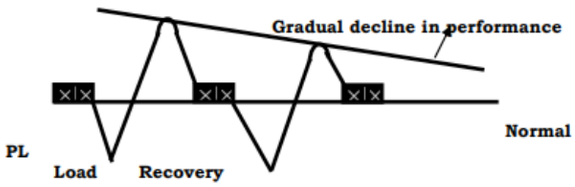
means are adopted to accelerate the process of recovery. Administering appropriate means can ensure quicker recovery and enable a sportsperson to undertake more frequent loads.

Recovery is the period and process during which the body responds to load. Adequate recovery may result in positive adaptations for athletic capacity, performance, and injury and illness risk. In contrast, inadequate recovery may maladapt for athletic ability, performance, injury, and illness.

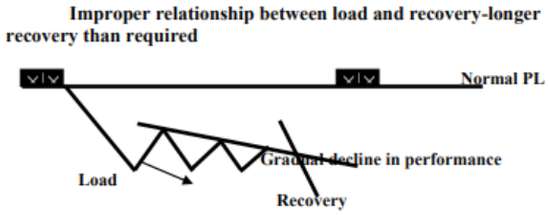
Recovery from training and competition loads requires a considerable amount of time. Recovery can be divided into the following three stages:



Proper relationship between phases of load and recovery



Improper relationship between load and recovery-longer recovery than required



Improper relationship between load and recovery-very high load and short recovery

Stage I:

In this phase, fatigue and recovery co-occur as the training or competition progresses. This process occurs because of the resynthesis of adenosine triphosphate (ATP), Creatine phosphate (CP), and glycogen and the neutralization of lactic acid. For activities, which continue for a long duration and for sports played for a considerable period, the pace of recovery in this phase plays an important role. Recovery during this phase largely depends upon the functional capacity and efficiency of different systems and organs.

Stage II

This phase commences with the completion of the training schedule (cessation of physical activity) and ends with the restoration of homeostasis of the body. This phase lasts from a few minutes to 2 to 3 hours. The following active recovery means can be adapted to make the recovery process faster.

1. Deep breathing exercises

2. Intake of drinks containing carbohydrates, vitamins, salts, and minerals.

Stage III

This phase of recovery can last from many hours to several days. In this phase, the anabolic process facilitates recovery. Substances such as enzymes and proteins, which get depleted in the process of undertaking the load, get resynthesized.

The pace of recovery is affected by the following factors:

Stimulus intensity and stimulus volume (factors of load).

a) Types of training load

b) Health and fitness status

c) Rest and sleep

d) Good diet

e) Daily routine

f) Total load of the day

Do you know?

There are two different categories of recovery:

- **Immediate or short-term recovery** - This is the most common form of recovery and occurs within hours after an exercise session or event. Short-term recovery includes low-intensity exercise after working out and during the cool-down phase.
- **Long-term recovery** - This refers to recovery periods that are built into a seasonal training schedule and may include days or weeks incorporated into an annual athletic programme.

Extension Activity

As a group, survey whether your school team preparing for zonal competitions for this year is recovering and adapting properly. Scale their level of physiological experience in the form below:

S.no	Experience	✓
1	Fatigue	
2	Loss of motivation	
3	Irritability	
4	Restlessness	
5	Weight loss	
6	Lack of mental concentration	
7	Sore muscles	
8	Anxiety	
9	Unrefreshed on awakening	

I. **Tick the correct options**

1. Which are the conditions that need to be fulfilled for adaptation to the training load?
   a. Recovery period should be in proportion to the training load.
   b. Rest should be given more focus than training
   c. Loading process must be repeated for a long period
   d. Training load should not be compromised even during injury
2. Factors for the slow pace of recovery include
   a. optimal health and fitness
   b. adequate rest and sleep
   c. good diet
   d. fatigue and lactic acid accumulation
3. Overload in training can be avoided by increasing
   a. intensity
   b. frequency
   c. duration
   d. recovery

II. **Answer the following questions briefly.**

1. What do you mean by adaptation?
2. Explain the importance of the recovery process in training?

III. **Answer the following questions in 150-200 words.**

1. Explain the conditions of Adaptation that ensure the effectiveness of the training load

10.3.1 Warming up and Limbering Down

Warming up is a process by which the human machine is brought to a condition at which it safely responds to the nerve impulses of the person for quick and efficient action. Warming up is heating the body's muscles and preparing them to start work. It helps the athletes prepare physically, mentally, and physiologically for any training or competition. If warming up is effective, muscles become ready to respond efficiently. In this process, muscles are warmed-up by running, jogging, and performing freehand exercises before the training or competition. This preparation before training or competition is called warming up. The following definitions may help to know more about warming up.

- "Warming-up raises the body temperature by running and performing exercises before the activity or competition."
- "Warming up is a practice in itself."
- "Warming up is a process by which human-machine is brought to a condition at which it safely responds to the nerve impulses of the persons for quick and efficient action."
- "Warming up is done to tone up the body to meet the ensuring activity."
- "Warming up consists of a series of preparatory exercises either before a training session or competition."

Picture Source: https://www.dreamstime.com/warm-up-exercise-set-workout-stretch-muscles-warm-up-exercise-set-workout-stretch-muscles-physical-training-image153271559

Types of Warming-Up

There are the following types of warming up.

1. **Passive Warming-up:** In this, the player warms up his body through external sources and not with actual participation in physical activity. It can be done by sunbathing, using a heavy uniform, drinking hot water, massage, drinking hot beverages (tea, coffee), etc. Performing Passive Warming-up by these means is beneficial because there is no energy expenditure in warming up.

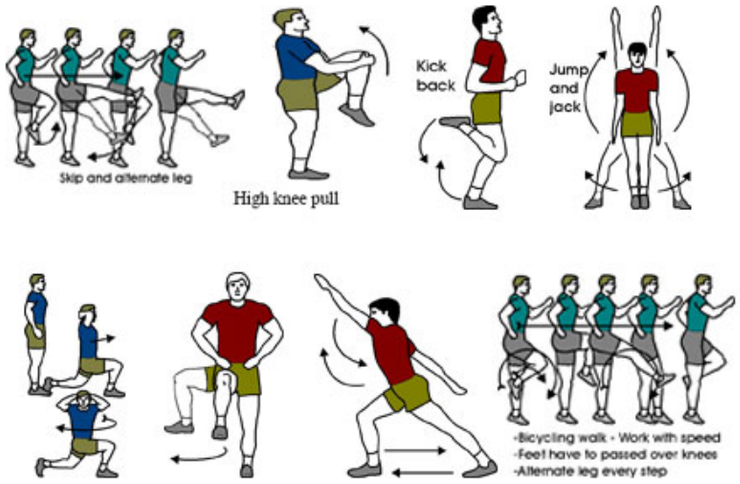
2. **Active Warming-up:** In active warming-up, the individual warms his body through actual participation in physical activities. These activities improve his efficiency and tone up the muscles for the training for competition. Its duration is 10 to 30 minutes. Warming up is done slowly without spending much energy just before the workout. In active warming up the body's temperature increases up to the required level. Jogging and stretching exercises are included in such type of warming-up. There are two types of active warming up:-

   (a) General Warming-up

   (b) Specific Warming-up

   (c) **General Warming-up:** General warming-up is usually performed in all types of activities. This warming-up type includes jogging, jumping-running, stretching, striding, wind sprints, calisthenics, and other general exercises. It increases the mobility of all the joints and improves the coordination of the body and mind. It also enhances muscle tone. It prepares the body physically and mentally. The duration of general warming up depends upon the nature of the work.

   (d) **Specific Warming-up:** These particular exercises are performed after the activities of general warming-up. The are of a particular type that vary from game to game. This type of warming up increases the mobility of all joints and improves the coordination of the body and mind. For example, a sprinter may take a few starts and run for a short distance before the actual competition. A basketball player may practice for lay-up shots or free throws before the match. The primary stress is practicing various skills in the game, in the specific warming-up.



Picture Source: https://exerciseinjuryprevention.weebly.com/

Do you know?

Warming up is a preliminary exercise of physical and mental preparation for strenuous exertion.

Specific Warming-Up for Some Games

- **Basket Ball:** Dribbling, shooting, shuttle run, lay-up shots, dodging, free throws and take practice, etc.
- **Cricket:** Dummy bowling and batting, catching, fielding, etc.
- **Badminton:** Tossing, high clear, low clear, smashing, making with jumps, dropping practice and court crafting, etc.
- **Tennis:** Knocking, wall practice, volley, clear service practice, clear slice, lob, return, etc.
- **Shot Put:** Shifting the shot from left hand to right hand and vice versa, standing throws, putting the shot with both hands, gliding practice with or without the shot, etc.
- **Kho-Kho:** Dodging, Zig-Zag running, pole to pole running.
- **Volleyball:** Blocking, passing, smashing, etc.

Methods of Warming Up

There are various methods through which an athlete can warm up his/her body.

1. **Physical Activities:** These activities involve some set of exercises for the body parts through which the body gets prepared to perform any task at an optimum level. These exercises must be done at a slow pace and low intensity to prevent fatigue or overload before the competition or sports event. Some of the best physical warming-up activities include:

(a) **Jogging** - This is generally done at a slow pace for 5 to 10 minutes to increase the body temperature.

(b) **Bending and Stretching Exercises** - These include limb and trunk exercises like stretching of shoulder muscles, arm muscles, clavicle muscles, back muscles, hip muscles, and leg muscles and include movements like flexion, extension, abduction and adduction, circumduction, and rotation.

(c) **Striding** - Striding is best before events requiring explosive effort. The athlete may run around 30 to 40 meters at sub-maximum intensity at least 3-4 times with proper rest in between.

(d) **Wind Sprints** - Wind sprints are sprinting exercises performed for short distance with spikes. The athlete moves from a walk or slow run to a faster run and repeatedly reverses.

2. **Massage:** This method increases and regulates blood flow in the body, thereby increasing the athlete's body temperature for producing efficient movement. Different techniques of massage include effleurage, petrissage, kneading, friction, vibration, and percussion.

3. **Drinking Hot Beverages:** This method including warm water, tea, coffee, etc stimulates the body's functions. However, care must be taken to consume these in limited quantities to avoid any discomfort.

4. **Bath:** Hot bath therapy is usually very common in sports in cold countries. It can be performed before and after the task. A hot bath before the event may improve the blood flow, and increase body temperature and muscle activation of the athlete. After the task, it may help an athlete to cure muscle tension and reveal relaxation to the body.

Importance of Warming Up

Warming up plays a vital role in sports training or competitions.

1. **Psychological preparedness:** Performing a set of routine or specific activities/ exercises before the training and competition helps an athlete plan and build himself /herself to competing readiness, thereby eliciting optimum output.
2. **Reduces anxiety and tension:** Warming up reduces anxiety and tension and increases the motivational levels of a sports person.
3. **Facilitate optimum performance:** Performance can be optimised by increasing the speed of nerve impulses and metabolic rate improving the reaction time of a sports person.
4. **Prevents sports injuries:** Adequate warming up before the training period or competition prevents loosening and tearing of muscles and reduces muscle cramping.

5. **Assists flexibility:** Warming up assists flexibility and increases the range of motion helping a sportsman to exert force up to maximum reach.

6. **Enhances mechanical:** Suppleness of muscles is increased through warming up.

7. **Facilitates motor fitness components:** Motor fitness components like strength, endurance, flexibility, coordinative abilities, and speed are enhanced.

8. **Increases muscle temperature:** As a result of warming up, which muscles both contract more forcefully and relax more quickly, the risk of over-stretching a muscle and causing injury is reduced. It also improves muscle elasticity; this can enhance speed and strength.

9. **Increases blood temperature:** Due to warming up, there is an increase of blood temperature and build up of lactic acid, which leads to weakening of the binding of oxygen to haemoglobin. As a result, oxygen is more readily available to working muscles, which may improve endurance.

10. **Blood vessels dilate:** Warming up dilates blood vessels that increases blood flow and reduces stress on the heart.

11. **Increases range of motion:** The increased range of motion allows large joints such as shoulders and knees to reach their maximum movement potential.

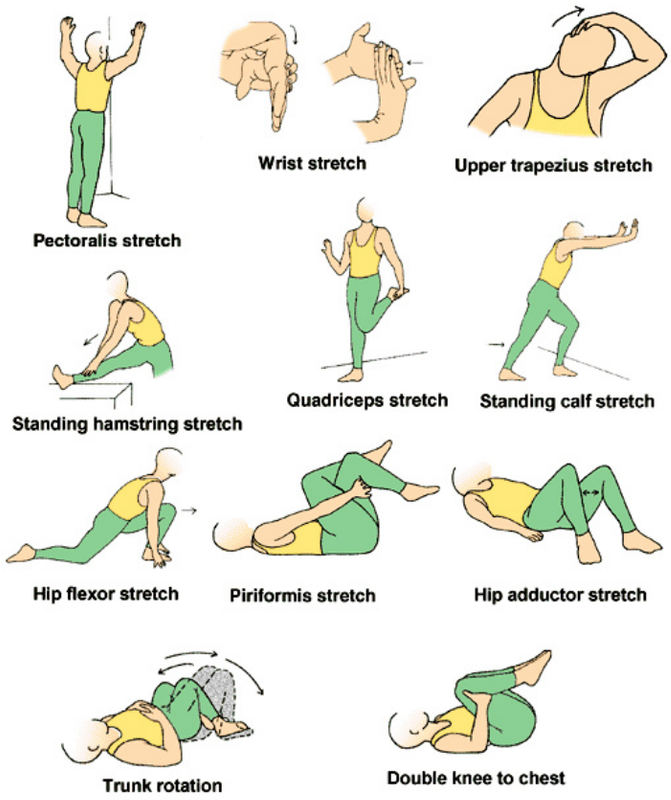
10.3.2 Meaning of Limbering Down

Limbering down or cooling down is also called warming down. This is an easy exercise that will allow the body to gradually shift from an exertional state to a resting or near resting state. It is a necessary activity after training or competition. Depending on the intensity of the exercise, cooling down can involve a slow jog or walk, or stretching can be used with lower intensities. Players take a cooling bath, ice bath, or cryotherapy for relaxing their muscles.

Some major static stretching exercises which are very important for cooling down are described here.

- **Ham Strings:** Lying on your back, raise one leg straight directly, above hips. Holding the calf or thigh, press the heel towards the ceiling as you pull the leg back towards the chest. Repeat the same for the other leg.
- **Chest:** Standing straight, interlace fingers behind your back. As you straighten out your arms, lift your chin towards the ceiling.
- **Glutes:** Lying on your back, cross your right leg over the bent left knee. Then bring the left knee to the chest, holding onto the back of your thigh, gently pressing the right knee wide.

- **Quadriceps:** Lying on your right side, pull left leg into the left glute, feeling the stretch in front of the thigh.
- **Triceps/Shoulders:** Take one arm overhead, bend at the elbow joint, and extend your palm down the centre of your back, gently pulling the elbow with the opposite hand. Take the same arm across the chest, gently pulling at the elbow joint to extend through the shoulder.



Picture Source: http://jump3.adsguest.com/html01_w301.php?hh=www.infracomposites.com&s=2.157.6282865.4.28.33.types%20of%20dynamic%20exercises

Do you know?

Stretching keeps the muscles flexible, strong, and healthy, and we need that flexibility to maintain a range of motion in the joints. Without it, the muscles shorten and become tight. Then, when you call on the muscles for activity, they are weak and unable to extend all the way. That puts you at risk for joint pain, strains, and muscle damage.

Benefits of Limbering Down

a) **Regulating your heart rate.** Exercising in general causes your heart rate to increase and after exercising, your heart beats faster than normal. You need to bring it to its normal rate, but stopping suddenly and quickly, without slowing down gradually, can cause dizziness and light-headedness. So, for instance, if you are running, the best way to slow your heart rate down is by walking.

b) **Control body temperate:** Exercising causes your body temperature to increase. After exercising, body temperature needs to be normalized. A proper cooling down or limbering down helps in reducing the body temperature to normal.

c) **Preventing injuries:** Like warming up, cooling down after exercises helps prevent injuries such as muscle tears. Skipping cooling down and stretching after a workout not only slows down muscle recovery but also reduces the benefits gained from a workout.

d) **Stress relief and relaxation.** Exercising is as good for the mind as it is for the body. As your body begins to slow down, you begin to get into a relaxed mood and the brain begins to release dopamine and serotonin, the two hormones that are responsible to make us feel good and less stressed.

e) **Body restoration.** Our bodies undergo several changes during working out, such as increased secretion of adrenaline, increased temperature, and accelerated breathing. Cooling down after a workout helps restore the body to its normal condition.

f) **Reducing the build-up of lactic acid.** After intense workouts, lactic acid builds up in our bodies which can lead to muscle cramping and stiffness. Cooling down helps speed up the process of releasing the lactic acids in our body and accordingly, the body recovers more quickly.

I. **Tick the correct option**

1. Warming up is performed to
   a. learn new skills
   b. enhance mechanical efficiency
   c. relax
   d. reduce heart rate
2. Cooling down activity is performed for
   a. dilating blood vessels
   b. increasing muscle temperature
   c. increasing blood temperature
   d. reducing the build-up of lactic acid

II. **Answer the following questions briefly.**

1. What do you understand by active and passive warm-up?
2. What do you understand by the term specific warmup?

3. List the names of any four muscles that relax during cooling down.

III. **Answer the following questions in 150-200 words.**

1. "Warm up is important for optimum performance". Justify the statement.

2. Define Cooling Down. Enlist the benefits of cooling down.

3. How is general warming up is different from specific warming up?

10.4.1 Concept of Skill, Technique, Tactics & Strategies.

Skill, Technique, and Style are essential attributes for an athlete to perform at an optimum level on the sports field. Some people are born with a natural ability for a particular game or sport such as speed, agility, coordination, flexibility, balance, and reaction time. But they still need to develop and perfect their skills with frequent practice to bring about the result they wish to achieve. In simple words, skill is a learned and practiced ability that helps an athlete or sportsperson achieve the desired result with maximum certainty and efficiency. Technique is the way of performing that fundamental skill/activity in a sport involving a well-timed and coordinated sequence of muscle actions so that the movements involved produce the best performance and are least likely to cause injury. Style, on the other hand, is the individual's way of adapting skill and technique to develop his/her performance in a smart way.

Skill

Skill can be defined as the capacity of the sportsman to realize the technique in actual motor action. Skill is defined as the automatization of motor action. Skill is sport-specific. It exists within all sports, but each sport needs different skills. A skill is seen as a coordinated action involving a group of movements executed consistently and smoothly. There are many interpretations of what constitutes a skilful movement because views vary from novice to expert. Several different experts have defined the skill. The following are some definitions: -

"An organized, coordinated activity in relation to an object or situation, which involves a whole chain of sensory, central and motor mechanisms."

"Galligan"

"Excellence of performance - the successful integration of a hierarchy of abilities appropriate to a task under given conditions."

"Prof. G.P. Meredith"

Picture Source: https://www.gq.com/story/watch-lionel-messis-record-breaking-free-kick

Do you know?

Anders Ericsson, a psychologist, writes that it takes 10,000 hours of practice to become an expert. In other words, an athlete training for 5 hours a day, for 7 days a week over 365 days a year would take about 5.5 years to acquire expertise in her/his chosen sport or game.

Technique

Technique is the mechanical model of doing any task through which an athlete minimizes his energy expenditure and produces remarkable output. It involves a well-timed and coordinated sequence of muscle actions that have been developed through the experience of players, coaches, and the analysis provided by sports science. These techniques have evolved and been refined so that the movements involved produce the best performance and are least likely to cause injury. Using good technique in sports is beneficial because it promotes high performance and reduces the risk of injury.

Picture

Thus, technique means the way of doing a particular task scientifically. This way

of doing a thing should be based on scientific principles and effectively achieve an aim. It is an essential movement of any sport or event. We can say that a technique is a way of performing the skill. It is the basic movement of any sport or event. For example, rolling the thumb over the cricket ball by the bowler in cricket is a technique to get the extra spin. Several techniques are combined into a movement pattern in the triple jump (running and then hop step and jump phases.)

"Technique is the most rational and effective form to perform exercises." A technique involves scientific and economic methods adopted to achieve top performance in sports competitions.

"Ozolin N.

Tactics

We can say tactics are the skills required in any game that allows a player or team to effectively use their skills and talent to the best possible advantage, consisting of tactical actions as well as other measures which are adopted before or during the competition for successful participation.

Tactics have been defined as the following.

- Tactics are actions and strategies planned to achieve an overall objective and, in the sport, that objective is predominantly to win.
- Tactics- It means the intelligent or creative application of skills during the competition.
- Tactics are methods by which performers try to outwit (get the better of, beat) an opponent.

Tactical preparation relates to measuring especially organized physical exercises, trials, mental drills, modelling, etc. Its aim is to inspire and encourage cognitive and competitive tactics. Tactical preparation enables athletes to make the most effective utilization of their motor and technical abilities in competitions. Strategy and tactics should not be used interchangeably. Strategy is the overall plan for successful participation in the competition whereas tactics is the actual realization of strategy in practice.

Factors affecting Tactics

a) Opposition – including their strengths and weaknesses.

b) Players available for selection.

c) The importance of the game/match.

d) Possibly even the weather.

Do you know?

The spatial component is foundational to tactical awareness. Once students appreciate the need to manipulate how they use 'space', then 'time' and 'force' components become a natural progression to their growing tactical sophistication. The advanced components add to the relationship aspect of tactical play. Opponents who can use space, force, and time to affect their play create an unpredictability that keeps the outcome of play uncertain as they probe the ability of their opponents. This relationship focus is fundamental to making gameplay.

Elements that develop Tactical understanding

Game and focus	Principle of Play depth	*Tactical Awareness Components for breadth*				
		Initial			*Advanced*	
		SPACE *Where*	FORCE *How*	TIME *When*	SELF *In relation to...*	OTHER *In relation to...*
Toss onto target Bounce, catch then send. Co-operative then compete	Consistency ↓ Placement & Positioning	Where is the biggest target area?	How hard send ball to be able to get ball to hit target?	When playing a shot can you get to next shot?	In relation to the ball move self to bounce of the ball	
		Where is your partner's target area?	How will you apply the force to keep the ball in?	When use height to recover?	What is the area to get into to be ready for next shot?	How can you anticipate the placement of partner's shot?
Castle game Bounce to hit target. Co-operative then compete	Consistency ↓ Placement & Positioning ↓ Spin & Power	Where will the ball land?	How can you use force to control ball accuracy?	When do you hit the ball high for time to get to bounce?	In relation to target where is best place to stand?	In relation to opponent's hit where should you stand?
		Where do you go after striking the ball?	How hard hit ball and in which direction to be ready for next shot?	When will partner hit ball to target?	How can you position yourself to use your favoured side?	Can you send the ball where your opponent does not expect it to go?
		Where will the ball bounce if you use spin?	How will force be applied to the ball to make it spin?	When should you spin the ball and when use power?	How well can you spin the ball and control placement?	How can you use spin to get your opponent out of position?

Strategies

Strategy is basically laying down the goals and making a plan to get there. In short, this is something like, having the goal to win the season or win the match as well as making a plan to achieve this, such as developing an athlete's power, working on comradery, and selecting the right players.

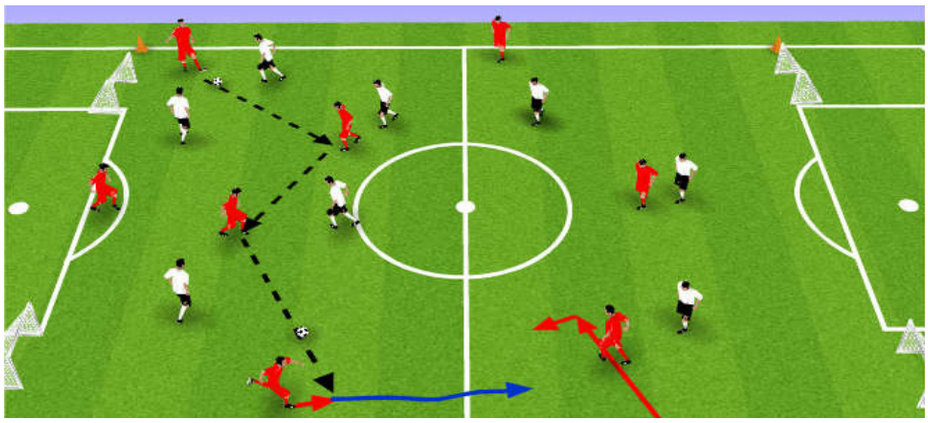
It can be defined as "a plan of action designed to achieve a long-term or overall aim."

Strategy often requires a SWOT (strengths, weaknesses, opportunities, and threats) analysis. The coach might analyse the team and plan to utilise strengths and develop weaknesses. She may also analyse the opposition to identify the best approach to be

used in the game to win. For example, the team has a weak tackler to target.

Strategizing is a great way to improve the team's synchronicity. The process involves aligning each member to the same end goal. Each of the players' motivations are combined and the team's morale consequently improves. Having the same focus and end goal will have them work as a unit in the game.

If the team has a strategy, improvements in players' individual performances becomes apparent. Each player will be more aware of their individual aims and their place in the team as a whole. Formulating strategies will involve open conversations and lots of set planning of techniques and tactics. As a result, players will be more confident about what is expected of them on the field. Every player will have a better understanding of their input in the team's performance and will be more motivated. For example: Football is a game of complex strategies and tactics. The basic strategy that each football team devises for a game is called a game plan. Each team has up to hundreds of diagrammed plays and strategies that are worked out ahead of time for pre-determined situations. During the game and at half time these strategies are worked on and altered to adjust for the other team's strategies. Often how well these adjustments are made will determine the outcome of the game (offensive or defensive strategy).



Picture Source: https://pesmic.weebly.com/grade-8/offensive-strategy

I. **Tick the correct answer.**

1. SWOT in strategy is required as

   a. strategy, working, output, and thought.

   b. strengths, weaknesses, opportunities, and threats.

   c. strengths, working, opportunities, and threats.

   d. success, weaknesses, outcome, and target.

2. In football, shooting is required to score goals. Shooting is a

   a. technique

   b. style

   c. skill

   d. strategy

3. The way of performing an action scientifically is

   a. style

   b. technique

   c. skill

   d. strategy

II. **Answer the following questions briefly.**

1. Define Technique.

2. What do you mean by strategy in sports?

3. Elucidate Tactics in brief.

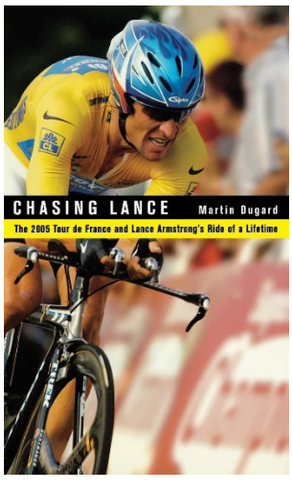
III. **Answer the following questions in 150-200 words.**

1. Explain the Technique with a suitable example.

LANCE ARMSTRONG CYCLE OF LIES

Lance Armstrong, (born September 18, 1971, Plano, Texas, U.S.), was an American cyclist, who was the only rider to win seven Tour de France titles (1999–2005) and was later stripped of all his titles. Why?

Armstrong entered sports at a young age, excelling in both swimming and cycling, and by the time he was a teenager he was competing in triathlons and swimming competitions. Before his high-school graduation, the junior national team of the U.S. Cycling Federation had recruited him. Armstrong competed in Moscow at the Junior World Championships and in 1990 won the U.S. Amateur Championships. In 1992 he turned professional when he joined the Motorola team, and one year later he became the second-youngest man to win in world road racing. Armstrong won stages of the Tour de France in both 1993 and 1995 but withdrew from three of four Tours he attempted from 1993 to 1996.



Picture Source: Chasing-Lance-Armstrongs-Lifetime-included/dp/0316166235

After the 1996 Tour de France Armstrong fell ill, and in October his physicians diagnosed testicular cancer, which had by that time also spread to his lungs and brain. He underwent chemotherapy and surgery, which were considered his best chances for survival. Months of treatments followed before he could attempt his comeback in a sport so demanding that some doctors questioned whether he could bear the strains of a three-week race like the Tour de France. In June 1998 he won his first important race since his cancer was diagnosed, the Tour of Luxembourg. Previously Armstrong had been a specialist in one-day races, but late in 1998, after a fourth-place finish in the three-week Vuelta an España (Tour of Spain), he was persuaded to change his training regime and compete in the next Tour de France.

On July 25, 1999, Armstrong became the second American to win the Tour de France, the sport's most prestigious race, and the first to win for an American team (three-time winner Greg LeMond had raced with European teams). Riding with the U.S. Postal Service (USPS) team, Armstrong won the 3,630-km (2,256-mile), 22-day race in 7 minutes 37 seconds. During the Tour, he fought allegations of doping, because traces of a banned substance—corticosteroid, from a prescription skin cream he used for saddle sores—were found in his urine. The International Cycling Union (Union Cyclist Internationale; UCI) cleared him, but he continued to endure accusations of doping, especially from the French press. Thus, Armstrong felt his July 23, 2000, win in the Tour de France to be a vindication of his 1999 win and an answer to his critics.

He won the Tour again in 2001 and 2002, relying on his strength in the mountain climbs. In 2003 he overcame crashes and illness to claim his fifth consecutive Tour de France, tying a record set by Miguel Indurain. He surpassed Indurain in 2004 when he won his sixth consecutive race. After winning his seventh Tour in 2005, Armstrong retired from the sport, but in September 2008 he announced that he was returning to competitive racing. He was placed third in the 2009 Tour de France and stepped away from competitive racing permanently in 2011.

In April 2010 Floyd Landis sent an e-mail to a USA Cycling official, admitting that he and other former teammates, most notably Armstrong, were guilty of doping. The following month a U.S. federal grand jury investigation into doping allegations against Armstrong was initiated. That year Armstrong finished 23rd in what he had announced, prior to the race's start, to be his final Tour de France. He retired for a second time in February 2011 and thereafter began competing in triathlons. The 2010 grand jury investigation was closed in February 2012 with no criminal charges filed against Armstrong.

In June of that year, the U.S. Anti-Doping Agency (USADA) alleged that Armstrong and five of his associates—three doctors, a manager, and a trainer—had been part of a decade-long doping conspiracy beginning in the late 1990s. According to USADA, Armstrong used performance-enhancing drugs—including erythropoietin (EPO) and human growth hormone—and distributed drugs to other cyclists. USADA also accused Armstrong of having undergone blood transfusions and testosterone injections. The allegations resulted in his immediate ban from triathlon competitions. In August 2012 he declined to enter USADA's arbitration process, which led the agency to announce that it would strip him of all his prizes and awards from August 1998 forward—including his seven Tour de France titles—and enact a lifetime ban from cycling and any other sport that follows the World Anti-Doping Code. Armstrong stated that his decision to no longer contest them was not an admission of guilt but was instead a result of his weariness with the process. Despite Armstrong's continued protestations of his innocence, the evidence of his doping was so overwhelming that in October 2012 he was officially stripped of his titles and banned from the sport when the UCI accepted USADA's findings. In January 2013, during a televised interview with Oprah Winfrey, Armstrong finally admitted to taking performance-enhancing drugs from the mid-1990s through 2005.

Apart from his racing career, Armstrong dedicated himself to campaigning for cancer awareness and established a foundation to further that goal. His Lance Armstrong Foundation became one of the largest organizations funding cancer research in the U.S., and the foundation's iconic yellow rubber "Livestrong" bracelet was a trendy fashion accessory for a time in the early years of the 2000s. However, in the wake of his doping scandal, he stepped down as the foundation's chairman and as a member of its board of directors, and the charity officially changed its name to the Livestrong Foundation. He published the memoirs It's Not About the Bike: My Journey Back to Life (2000) and Every Second Counts (2003), both co-authored by Sally Jenkins

10.5.1 Concept & Classification of Doping

Doping refers to an athlete's use of prohibited drugs or methods to improve training and sporting results. Steroids are the drugs that often come to mind when we talk

about doping. In addition, doping also includes an athlete's use of other forbidden drugs (such as stimulants, hormones, diuretics, narcotics, and marijuana), use of prohibited methods (such as blood transfusions or gene doping), and even the refusal to take a drug test or an attempt to tamper with doping controls. The IOC defines doping as the use of any method or substance that might harm the athlete in a quest to gain an unfair advantage over their fellow competitors.

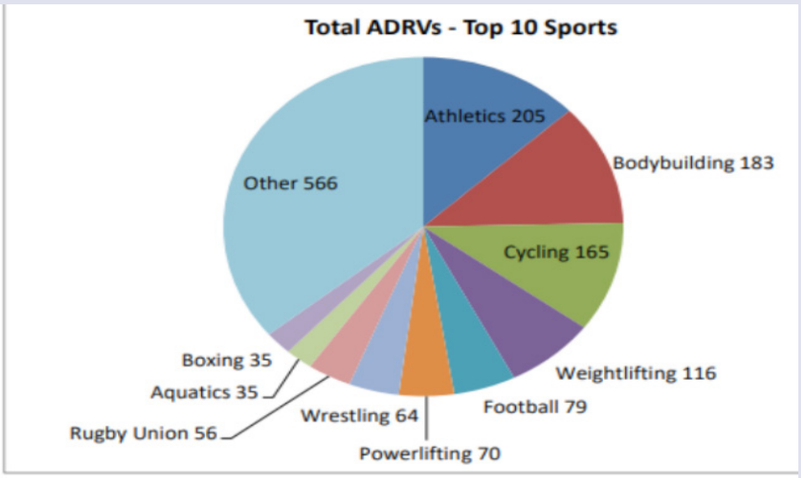
Hence, training at altitude to increase the blood's ability to carry oxygen is allowed, but using drugs such as EPO to achieve the same result isn't. The controversy in 'Le Tour de France', and the Atlanta games of 1996, have shown the use of doping to be widespread. However, doping isn't a new trend bought on by the advent of modern pharmaceutical agents. History shows that athletes in the ancient Olympic games were willing to take plant extracts to better their competitors.

Do you know?

Doping was punished even in ancient times. If athletes were caught cheating, they were banned from the games and their names were often engraved into stone and placed in a pathway that led to the stadium. To this day, those stone pedestals line the entranceway to the Olympic stadium in Olympia, Greece, the site of the ancient Olympics (776 BC-394 AD). Inscribed on each pedestal is the name of the offending athlete, his wrongdoing, and the names of family members.

Sports with the highest number of Anti-Doping Rule Violations (ADRVs)

1. Athletics (205)
2. Bodybuilding (183)
3. Cycling (165)
4. Weightlifting (116)
5. Football (79)
6. Powerlifting (70)
7. Wrestling (64)
8. Rugby Union (56)
9. Aquatics (35)
9. Boxing (35)



International Olympic Committee defines doping as "the use of any method or substance that might harm the athlete, in a quest to gain an unfair advantage, over his/her fellow competitors." In other words, it can be said that doping is the use of such substances or methods that are custom-made to increase the abilities of an athlete, both physical and mental, and/or to cover the use of such substances while in training.

According to World Anti-Doping Agency (WADA, "Doping is defined as the occurrence of one or more of the anti-doping rule violations set forth in Article 2.1 through Article 2.8 of the anti-doping code (WADA code effective from 1 Jan 2021). These are as follows:

I. Presence of a prohibited substance or method.

II. Use or attempt to use a prohibited substance or method.

III. Refusing to submit sample collection after being notified.

IV. Failure to file athlete's whereabouts after being notified.

V. Tampering with any part of the doping control process.

VI. Possession of a prohibited substance or method.

VII. Trafficking a prohibited substance or method.

VIII. Administering or attempting to administer a prohibited substance or method to an athlete.

Thus, according to the anti-doping code, doping is not only about using a prohibited substance or method to improve performance but also about breaking any of the rules listed by WADA.

Following are some of the substances and methods used for doping in sports:

"The use of any support or practice that improves athletic performance or physical work capacity. It can be achieved through physical, pharmacological, psychological, nutritional or mechanical means" (Katch et al. 2007).

Do you know?

The World Anti-Doping Code (Code) is the core document that harmonizes anti-doping policies, rules, and regulations within sports organizations and among public authorities around the world. It works in conjunction with eight International Standards which aim to foster consistency among anti-doping organizations in various areas. Every year WADA publishes an updated code every year. The following 2022 list is as follows:

SUBSTANCES & METHODS PROHIBITED AT ALL TIMES

- S0: Non-approved substances
- S1: Anabolic agents
- S2: Peptide hormones
- S3: Beta-2 agonists
- S4: Hormone and metabolic modulators

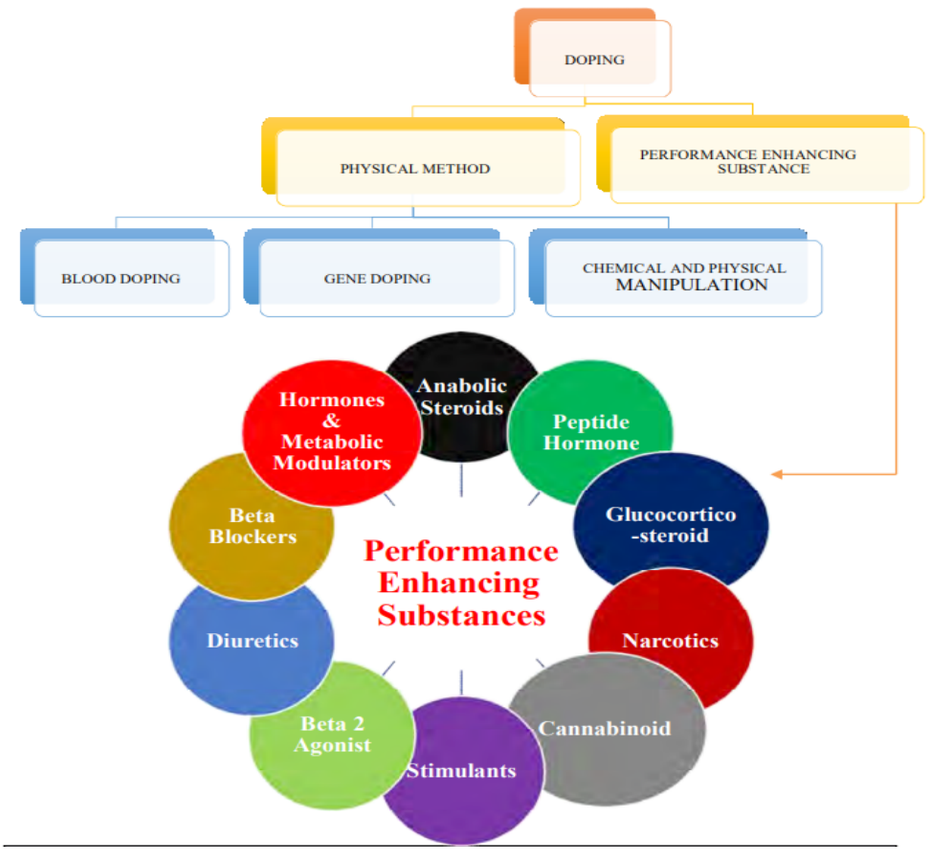
- S5: Diuretics and masking agents
- M1: Manipulation of Blood and Blood Components
- M2: Chemical and Physical Manipulation
- M3: Gene and Cell Doping

SUBSTANCES & METHODS PROHIBITED IN-COMPETITION

- S6: Stimulants.
- S7: Narcotics.
- S8: Cannabinoids
- S9: Glucocorticoids.

SUBSTANCES PROHIBITED IN PARTICULAR SPORTS

- P1: Beta-blockers



Extension Activity

Survey of Doping in Sports

Talk to at least 15 sportspersons or athletes from your school, or a nearby school. You could also talk to people who regularly go to a gym for a workout. Fill up the following questionnaire.

	No	Don't know	Maybe	Probably	Yes
Do you think doping is necessary to achieve the best results?					
Does anyone you know use performance-enhancing drugs?					
Are you aware of the substances you cannot use in competitions?					
Do you think your performance would improve by banned substances?					
Have you ever tried any banned substances to improve performance?					
Are you aware of the side effects of doping?					
Is the NADA doping test available for the tournaments/ competitions you participate in?					
According to you who recommends performance enhancing drugs toplayers?					
Have you felt a pressure to use banned substances?					
Based on the survey above, and your own ideas, make a PPT on Doping and Sports.					

I. **Tick the correct options**

1. Doping refers to an athlete's use of
   a. prohibited drugs and methods
   b. methods to improve training

c. methods to improve performance.

d. Altitude training for oxygen capacity

2. WADA stands for

a. World Anti-Doping Association

b. World Anti-Doping Alliance

c. World Anti-Doping Agency

d. World Anti-Doping Alumina

II. **Answer the following questions briefly.**

1. Is doping only about using a prohibited substance or is it a method to improve performance? Comment.

2. Enlist any three (WADA) Anti-Doping Codes which are mentioned in Articles 2.1 to 2.8. Classify the methods of doping in brief.

III. **Answer the following questions in 150-200 words.**

1. List the rules laid down by WADA in the anti-doping code.

Anabolic Steroids:

Anabolic steroids, also known more properly as anabolic-androgenic steroids, are steroidal androgens that include natural androgens like testosterone and synthetic androgens that are structurally related and have similar effects to testosterone.

Anabolic steroids include testosterone, the male sex hormone, and structurally similar compounds. In addition to increases in muscle mass and bone maturation, these compounds promote the production of creatine phosphate, which allows the athlete to train harder. Other desired effects of anabolic steroids include increased fat-free mass, strength, aggression, and ability to sustain and recover from high-intensity workouts.

Picture Source: https://teens.drugabuse.gov/drug-facts/steroids-anabolic

The side-effect of Anabolic steroids

a) High blood pressure,

b) Acne,

c) Abnormalities in liver function,

d) Alterations in the menstrual cycle,

e) Decline in sperm production and

f) Impotence in men,

g) Kidney failure and heart disease, and

h) Heightened aggression.

Do you know?

Testosterone was first synthesized in Germany in 1935 and was used medically to treat depression. Professional athletes began misusing anabolic steroids during the 1954 Olympics when Russian weightlifters were given testosterone. In the 1980s, anabolic steroid use began to extend into the general population, and young men began using these substances, sometimes to enhance athletic performance but in most cases to improve personal appearance.

Human Growth Hormone

Human growth hormone (hGH)- also called somatotrophin or somatotrophic hormone is naturally produced in the body. It is synthesized and secreted by cells in the anterior pituitary gland located at the base of the brain.

The primary role of hGH in body growth is to stimulate the liver and other tissues to secrete insulin-like growth factor IGF-1. IGF-1 stimulates the production of cartilage cells, resulting in bone growth, and plays a crucial role in muscle and organ growth. All of these can boost sporting performance.

Picture Source: https://www.shutterstock.com/video/search/human-growth-hormone

Side effects Human Growth Hormone

a) Diabetes in individuals prone to it

b) Worsening of heart disease and muscle, joint, and bone pain

c) Hypertension

d) Cardiac deficiency

e) Abnormal growth of organs

f) Accelerated osteoarthritis and

g) Enlargement of the extremities, such as hands and feet.

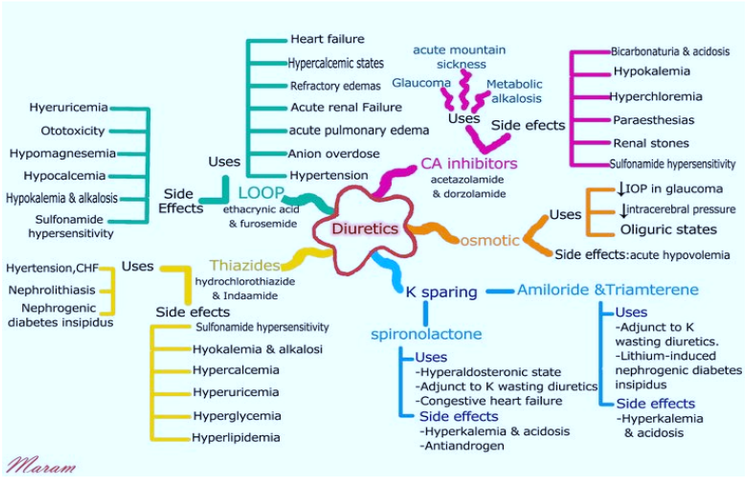
Did you know?

The first human to receive GH therapy was in 1956; it was of bovine origin and was given for 3 weeks for metabolic balance. Studies revealed no effects. Growth hormone (GH) first was isolated from the human pituitary gland in 1956, by both Li and Papkoff, in California, and Raben, in Massachusetts, but its biochemical structure was not elucidated until 1972. In 1958, Raben reported the results of the first trial to show the effects of human GH on growth. By 1960 it was clear that GH-deficient children would benefit from pituitary GH. In 1960, National Pituitary Agency (NPA) was formed to further the goals of coordinating pituitary collection and extraction to support both basic and clinical research.

Diuretics

Diuretics, sometimes called water pills, help rid your body of salt (sodium), and water and inhibit the re-absorption of water in the kidney. Most of these medicines help kidneys release more sodium into the urine. The sodium helps remove water from blood, decreasing the amount of fluid flowing through veins and arteries. This reduces blood pressure. Diuretics can be used in a sport as a masking agent to prevent the detection of another banned substance.

As well as masking other drugs, diuretics can also help athletes lose weight, which they could use to their advantage in sports where they need to qualify in a particular weight category.



Picture Source: https://www.pinterest.com/pin/727120302308304512/

Side Effects include:

a) Headaches

b) Muscle cramps

c) Dizziness

d) High blood sugar levels

e) Abnormal heart rhythm

f) Fatigue

Do you know?

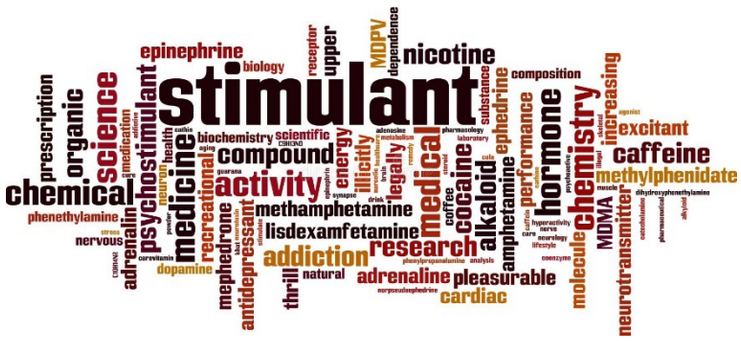
The modern history of diuretics began in 1919 when a medical student at the University of Vienna found that mercurial injections effectively excreted water in syphilitic patients. For decades, these drugs were considered the main weapon to treat oedema, despite their toxicity. Only by the end of the Second World War specialized and advanced studies were conducted, and it was then proved that sulphonamide derivatives had diuretic properties.

Stimulants

Stimulants are a group of drugs that result in increased activity in the body. Sometimes referred to as "uppers," these drugs are frequently abused due to their performance-enhancing and euphoric effects. This type of drug speed up messages traveling between the brain and body.

Stimulants speed up mental and physical processes, which can produce desirable

effects in the short term by increasing dopamine levels in the brain. While users may feel great due to the short-term effects of stimulants, long-term abuse of these drugs can have significant consequences. Generally, those who abuse stimulants experience heightened energy levels and enhanced focus. They can make a person feel more awake, alert, confident, or energetic. Stimulants are usually snorted, swallowed, smoked, or injected. Prescribed stimulants are typically taken orally, and the duration of their effects differs depending on the type.



Picture Source: https://image.shutterstock.com/image-photo/narcotic-word-cloud-hand-marker-600w-1191150307.jpg

Side effects of stimulants include

a) Anxiety

b) Tension

c) Increased body temperature

d) Nausea

e) Tremor

f) Seizures

g) Coma

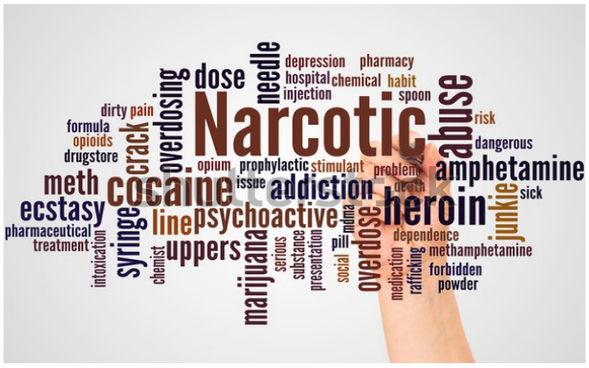
h) Death.

Do you know?

Stimulants, including cocaine and amphetamines, are among the most widely used and abused illegal substances. The first of the synthetic stimulants, amphetamine (isolated in 1887), was first popularized in the 1930s with an OTC nasal decongestant (Bezedrine inhaler) containing the amphetamine phenylisopropylamine and later for fatigue, narcolepsy and depression.

Narcotics

Narcotics are drugs that can change a person's psychic and physical status through a wide range of symptoms, from sleep to euphoria and excitation. Narcotics are a type of drug injected into a human's bloodstream, muscles, or under the skin and can also be swallowed. The main effect of narcotics is to reduce, eliminate, and hide the pain.



Picture Source: https://image.shutterstock.com/image-photo/narcotic-word-cloud-hand-marker-600w-1191150307.jpg

Side effects of narcotics are

a) Nausea

b) Vomiting

c) Constipation

d) Sweating

e) Mental confusion and drowsiness

f) Affect Cardiovascular, respiratory, and central nervous systems.

Do you know?

Narcotics occurring naturally in the form of opium derived from poppy have been used since ancient Greek times, both for relieving pain and for producing euphoria. Extracts of opium were smoked, eaten, or drunk (as laudanum, a crude mixture of alcohol and opium). The pharmacologically active components of opium were isolated during the first half of the 19th century. The first was morphine, isolated by a young German pharmacist, F.W.A. Sertürner, in about 1804. A much milder narcotic, codeine, was in turn isolated from morphine.

Blood Doping

Blood doping or "blood manipulation" is a prohibited method of improving an athlete's performance by artificially boosting the blood's ability to bring more oxygen to muscles.

The three widely used types of blood doping are:

a) Blood transfusions

b) Injections of erythropoietin (EPO)

c) Injections of synthetic oxygen carriers

Do you know?

Blood doping started in the late 1960s, but was not outlawed until 1986. While it was still legal, it was commonly used by middle and long-distance runners. The first known case of blood doping occurred at the 1980 Summer Olympics in Moscow as Kaarlo Maaninka was transfused with two pints of blood before winning medals in the 5 and 10 kilometre track races, though this was not against the rules at the time.

Blood transfusions

The most basic method of increasing the amount of haemoglobin of an athlete is through blood transfusion. There are two forms of blood doping: autologous and homologous.

Autologous blood doping is the transfusion of one's blood, stored, refrigerated, or frozen until needed.

Homologous blood doping is the transfusion of blood that has been taken from another person with the same blood type.

Although blood transfusions for blood doping date back several decades, experts say its recent resurgence is probably due to the introduction of efficient EPO detection methods.

Do you know?

The history of blood transfusion originated with William Harvey's discovery of blood circulation in 1628. The earliest known blood transfusions occurred in 1665, and the first human blood transfusion was performed by Dr. Philip Syng Physick in 1795. The first transfusion of human blood for the treatment of haemorrhage was performed by Dr. James Blundell in London in 1818. The first blood bank was established in Leningrad in 1932, and the first blood bank in the United States opened at Chicago's Cook County Hospital in 1937.

Injections of Erythropoietin (EPO)

Erythropoietin EPO is a peptide hormone produced naturally by the human body. EPO is released from the kidneys and acts on the bone marrow to stimulate red blood cell production, and this hormone regulates the number of red blood cells in the body.

Athletes inject EPO to increase the concentration of red blood cells and their aerobic capacity.

Do you know?

Human EPO was first isolated from the urine of anaemic patients in 1977, and its gene was later isolated in 1983. One year later, 2 groups succeeded in cloning the EPO gene and expressing it in Chinese hamster ovary (CHO) cells, enabling development of recombinant human EPO (rHuEPO) as a drug.

Injections of Synthetic oxygen carriers

These are chemicals that can carry oxygen. Athletes use synthetic oxygen carriers to achieve the same performance-enhancing effects of other types of blood doping: increased oxygen in the blood that helps fuel muscles. Synthetic oxygen carriers include perfluorocarbons and haemoglobin-based oxygen carriers. These agents effectively transport and deliver oxygen to tissues and have been explored as oxygen carriers in blood-substitute products for purposes such as emergency blood transfusion.

Side effects of blood doping include

a) Quick increases in blood pressure

b) Convulsions

c) Influenza-like symptoms

d) Increased cancer risk

e) Liver damage

f) Increased viscosity of blood

g) Thickening the blood,

h) HIV

i) hepatitis B

j) hepatitis C

k) Heart disease, stroke, and cerebral or pulmonary embolism.

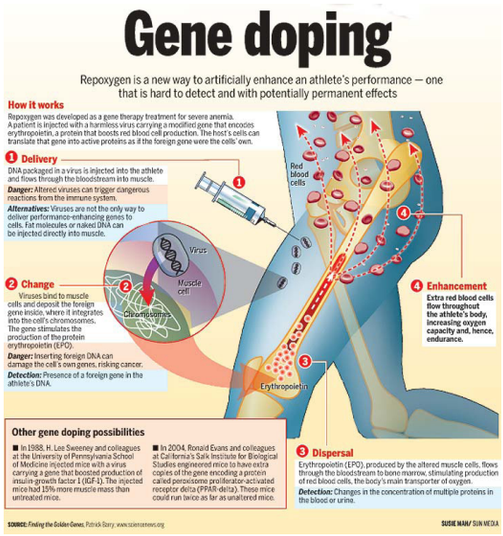
Do you Know?

Artificial oxygen carriers were initially developed as "blood substitutes" in the 1980s and 1990s. Artificial oxygen carriers can be grouped into haemoglobin-based oxygen carriers (HBOCs) and perfluorocarbon-based oxygen carriers (PFCs).

Gene Doping

Gene doping is a form of drug abuse in sport in which genetic material is injected into the muscle to improve someone's performance or make their muscles grow stronger. According to World Anti-Doping Agency (WADA). Gene doping is the transfer of nucleic acids or nucleic acid sequences and the use of standard or genetically modified cells.

Advancements in gene therapy for medical reasons mean potential cheats might seek to undergo procedures to modify their genes to enhance their physical capabilities. Genetic enhancement includes manipulating genes or gene transfer by healthy athletes to improve their performance physically. Genetic enhancement includes gene doping and has the potential for abuse among athletes. It is said that gene doping could be used to increase muscle growth, blood production, endurance, oxygen dispersal, and pain perception.



Picture Source: https://genedopingkondapi.weebly.com/what-is-gene-doping.html

Side effects of Gene Doping include

a) Cancer

b) Autoimmunization

c) Heart attack.

d) Increased blood viscosity

e) Difficult laminar blood flow through the vessels

f) Severe immune response

g) Abnormal vision

h) Headache

i) Nausea

j) Vomiting

Do you know?

The concepts of gene therapy arose initially during the 1960s and early 1970s. The history of concern about the potential for gene doping follows the history of gene therapy, and the medical use of genes to treat diseases, which was first clinically tested in the 1990s. In 1999, the field of gene therapy was set back when Jesse Gelsinger died in a gene therapy clinical trial, suffering a massive inflammatory reaction to the drug.

I. **Tick the correct options**

1. The performance enhancement drug generally used by boxers and judo players to reduce their weight is

   a. Diuretic

   b. Peptide hormone

   c. Anabolic steroid

   d. Beta-2 agonist

2. Stimulants benefit performance by

   a. increasing heart and respiratory rates and suppressing the symptoms of fatigue

   b. having a painkilling and sedating effect

   c. releasing hormones promoting growth, healing and body repair

   d. preventing the release of adrenaline

3. Some of the side effects of using narcotics include

   a. suppressed appetite, increased blood pressure, and body temperature

   b. addiction, suppressed appetite, toxicity

   c. impotency, infertility, arteriosclerosis, heart disease, liver and kidney cancer

   d. a damaging effect on endurance, heart disease

4. The full form of NIDA is

   a. National Institute of Drug Abuse

   b. National Institute of Dramatic Art

   c. National Institute of Developmental Administration

   d. National Institute of Drug Anabolic

5. The term psychoactive refers to

   a. a drug that alters mood, cognition and/or behaviour.

   b. a drug that lowers the threshold of pain.

   c. a particularly active psychopath.

   d. a drug-induced hallucination.

6. When you are dealing with the people of Substance abuse, what will be your initial step?

   a. Detoxification

   b. Supportive Environment

   c. Rehabilitation

   d. Medication

II. **Answer the following questions briefly.**

1. Players using peptide hormones to enhance performance suffer from serious side effects. What are these side effects?

2. List the names of prohibited substances according to WADA (latest).

3. While it is easy to reduce weight through a diuretic substance, it may have serious consequences. Explain the side effects associated with diuretics abuse?

4. What is a prohibited substance? How does it affect the sports person's performance?

5. Define substance abuse.

6. How can you identify the sports person who is suffering from substance abuse?

7. What do you understand by the term Rehabilitation?

8. List the signs and symptoms of substance abuse.

III. **Answer the following questions in 150-200 words.**

1. Adopting illegal ways to enhance performance by taking Performance Enhancing Drugs may lead to severe side effects. List the major side effects of Doping.

2. Explain any two doping steroids. Mention five side effects of each.

3. What do you understand by substance abuse. List the health issues arising out of use of psychoactive drugs.

4. Discuss your views on Doping.

5. With training in sports, how we can achieve the target to produce better results in 2024 Olympic Games. Share your views

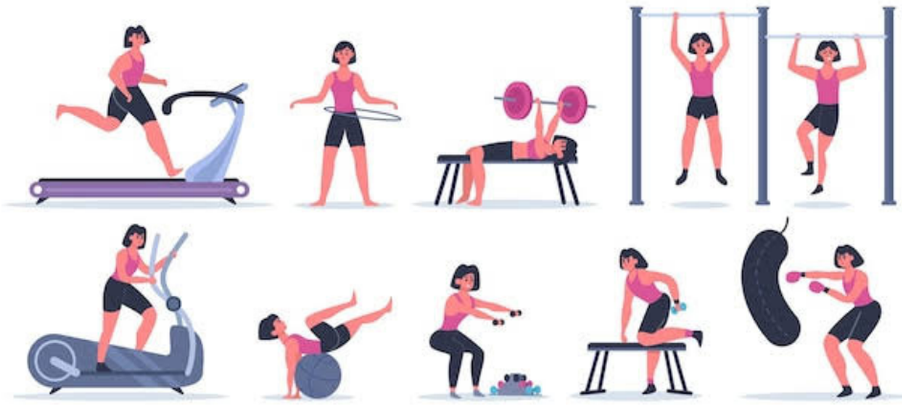
IV. **Complete the table regarding Doping in Sports.**

Substance	How it is taken	Reasons for taking it	Harmful effects
Anabolic Steroids			
Peptide Hormone			
Glucocorticosteroid			
Narcotics			
Cannabinoid			
Stimulants			
Beta 2 Agonists			
Diuretics			

Beta Blockers			
Hormones and Metabolic Modulators			

V. CASE STUDY

Training and Doping in Sports



Solis was identified by his basketball coach as a talented player. He was thus asked to come daily in the morning for coaching with the school team members. He was explained about training principles and use of techniques and skill development.

a) List down any four principles of sports Training.

b) What could be the causes of overload?

c) What are the factors affecting recovery?

d) A training plan is constructed by incorporating various training cycles. A micro cycle may last from _____ days.

e) Principle of _____ helps in incorporating the law of readiness.

VI. ART INTEGRATION – MAKING POWERPOINT PRESENTATION

Staging A Play About Fair Play in Sports

Games and contests become opportunities to strive – with opponents – for excellence. Those who cheat or take performance-enhancing drugs do not play the game. Fair Play means more than just following the rules.

A sportsperson who plays fair:

- Respects the Rules
- Respects the officials and accept their decisions
- Respects opponents
- Gives everyone an equal chance to participate
- Maintains self-control at all times

Choose a situation where an athlete

- Broke rules
- Cheated/took drugs
- Or, helped an opponent.

Write a play about her/him.

Perform the play during the Special Assembly of your school.

Suggested Reading

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