Course Name : Bachelor of Physical Education

Year : IInd (Part - I)

Paper Name : Yoga

Paper No. V

Lecture No. 1

Topic no. : Section D 1(e)

Lecture Title : Difference Between Yoga and Non - Yogic Exercise

Introduction

There are numerous physical culture systems designed to develop the muscles. Physical culturists develop them by mechanical movements and exercise. Yogic exercises not only develop the body. But also broaden the mental faculties. Moreover, the yogi acquires mastery over the involuntary muscles of his organism.

Yogic and Ordinary Physical Exercises

The fudamental difference between yogic exercises and ordinary physical exercises is that physical culture emphasizes violent movements of muscles, whereas yogic exercises oppose violent muscle movements as they produce large quantities of lactic acid in the muscle fibres, thus causing fatigue. The effect of this acid and the fatigue it causes is neutralized by the alkali in the muscle fibres, as well as by the in haling of oxygen.

It is on this theory that modern physical culturists work. They try to increase the intake of oxygen so that fatigue may be lessened while working. Although their theory seems sound enough, the founders of the yoga systems for many centuries possed a knowledge superior to all modern theories. The yoga system is not new, it had been taught for many centuries before the modern systems were conceived.

Muscular Development

Muscular development of the body does not necessarily mean a healthy body, as iscommonly assumed, for health is a state when all organs function perfectly under the intelligent control of the mind.

Rapid movement of the muscles causes a tremendous strain on the heart. In the yogic system, all movements are slow and gradual with proper breathing and relaxation. Carbon dioxide and other metabolites are produced by active muscles. A moderate excess of these substances stimulates the heart to beat more strongly, so exercises produce their own essential heart stimulant.

During exercise, more blood is returned to the heart than during rest. This is due to an increased venous return, which the contracting skeletal muscles introduce into the flow of blood. The pressure on the vessels by the contracting muscles pushes the blood along and the venous valves prevent the backward flow. The blood must move on toward the heart when pushed by the active muscles; as a result , the heart is better filled, which in turn stretches the fibres. When the fibres are stretched they contract more forcibly, which meansd a stronger heartbeat and more blood being pumped out. The more foreful contraction owing to stretching of the muscles was discoved by the physiologist straling and is called straling's law of heart.

The heart, the most important organ, starts beating in the embryo even before nerves have grown out to it and it continues working until the last moment of man's life. Therefore, it is advisable to avoid strenuous exercises that put extra strain uopn it.

Main Purpose of Exercise

The main purpose of exercise is to increase the circulation and the intake of oxygen. This ca be achieved by simple movements of the spine and various joints of the body, with deep breathing but without violent movement of the muscles.

As the exercises are meabt for increasing circulation through the motion of skeletal muscles and to increase the intake of the oxygen, let us take a hasty glance at the function of the muscles in heavy and moderate exercises like yogic exercises.

When muscles contract glycogen breaks down to lactic acid and additional energy is released. This energy is used for the reforming of organic phosphates from onorganic phosphates and/or organic compounds. One-fifth of the lactic acid so produced is oxidized to carbon dioxide and water, energy again being

released. This last batch of energy is utilized in the reformation of glycogen from the remaining four-fifths of the lactic acid. Fatigue is the result of the muscles' in ability to get enough oxygen to oxidize a sufficient amount of the lactic acid formed. When too much lactic acid accumulated, the muscles become temporarily unable to contarct. During the strenuous exercises for instance, we are unable even thiugh respiration is deeper and faster to breathe in sufficient oxygen to meet muscular demands. An oxygen debt is created. This debt is the difference between the amount of oxygen actually needed by the active muscles and what is actually recieved. Thus after the completion of the exercise at rest in order to repay the oxygen debt.

What happens in moderate exercise? With the beginning of moderate exercise like housework, walking at moderate speed, etc., the skeletal muscles become more active than before. A series of events occurs which result in a greater flow of blood carriying an increased supply of oxygen and fuel to the active muscles. As muscle activity increases, muscle metabolism does likewise. The increased metabolism means greater heat production. The warming of the muscles lowers their viscosity and increases the efficiency of the work they perform. Body temperature probably will not rise appreciably. The warmed blood leaving probably will not rise appreciably. The warmed blood leaving the muscles will shortly reach the heat lowering cebtre in the hypothalamus. Reflex dilation of skin vessels will allow more heat loss by radiation, balancing the increased heat production.

The increased muscle metabolism will also mean a greater output of carbondioxide, resulting from the increased oxidation of glucose increased amounts of carbon dioxide will diffuse into the smaller blood vessels of the muscle fibres causing the walls of these vessels to relax. Their consequent dilation will allow more blood to flow more quickly through the skeletal muscles.

The increased amount of carbon dioxide in the blood will not only exert local actrion but will, in its travels help to coordinate the general responses of the circulatory and respiratory systems with the demands placed upon them. Upon reaching the heart, the carbon dioxide directly stimulates the cardiac muscles will result in an increased output of blood per beat.

The increased carbon dioxide concentration in the blood flowing through the medulla of the brain directly stimulates the respiratory centre. In turn. The respiratory centre responds with an increase in the frequency of the impuluses it rhysthmically discharges. The greater number of impluses which eventually

reach the diaphragm and intercostal muscles induce stronger than usual contractions. Thus breathing become deeper.

Stimulaton of the vasoconstrictor centre send impulses along vasoconstrictor nerves to the arterioles of the abdominal acvity. Construction of the many arterioles in this region significantly increases the peripheral resistance and the general arterial blood pressure resis. Constriction of these blood vessels also serves to shuntblood from the adbominal organs to the skeletal muscles whose vessels are dilated. The increased number and force of skeletal muscle contractions squeeze down upon the veins more vigorously and thus help to pump blood back to the heart more quickly. The respiratory pump also aids in this deeper breathing means greater fluctuaction of pressures within the thoracis and abdominal cavities. The alternating expansions and compressions of the large veins in these cavities will be increased in force and more blood will be forced onward to the heart.

The increased return of blood to the heart stretches the heart muscle, increasing its force of contraction and thereby. Its output per beat. The faster heart rate plus the stronger contractions of the cardiac muscle increase the cardiac output per minute and this, in turn, aid in prodicing the rise in blood pressure. Faster and deeper breathing ventilates the lungs nore thoroughky. A greater amount of carbon dioxide is thus removed in the expired air, which prevents its concentration from rising too high in the blood because too much carbon dioxide can increase the acidity of the blood to a dangerous extent.

During exrecise the active muscle oxidize more glucose and do it more rapidly than before, because of the increased temperature in them. This tends to deplete the blood sugar concentration. Since the sugar in the blood sugar concentration cause more glycogen to break down into glucose, which is relased into the blood. As the muscles drain more glucose from the blood, more is poured into it from the liver. Some of the lactic acid formed in the breakdown of glucose also gets into the blood, is carried to the liver, and is there converted to glycogen. There is an adequate machanism, then for supplying fuel to the active muscle. In moderate exercise the oxygen supply can keep pace with the oxygen used and no oxygen debt results. The only residual effects will be a depletion of the carbohydrate reservation and a need for more protein to be used in rebuilding the cells that broke down in activity.

As we prepare to take strenuous exercise, there usually is a mental and emotional warming up. The memories and emotion caused by previous experience, especially if the exercise involves competition of one sort or

another, stir up the nervous system to an increased tone. This helps to ready the body for the demands soon to be placed upon it. The subjective feelings may induce autonomic effects; a quickened pulse, faster breathing, and dilation of the pupils are not uncommon at times like this.

The many changes previosly described for moderate exercise take palce in strenous exercise, too. Yoy might imagine there would be even more, but where differences cccur they are mainly differences in degree rather in kind. The heart rate is faster, blood pressure higher, respiration faster and deeper,a nd circulation time more rapid than in moderate exercise.

Adrenaline may be released from the adrenal medula and aid in the respiratory and circulatory changes. It would also favor the release of glucose from liver glycogen and delay fatigue of skeletal muscles.

The greatest limiting factor from the maintenance of severe exertion is the oxygen suppy. Even though the spleen is stimilated to contract and discharge red blood cells into the blood, the intake of oxygen cannot meet the muscular demands for it, consequently, lactic acid is accmulated in muscle and in blood. Without sufficient oxygen to reconvert fatigue sats in. There is a limit to the size of the oxygen debt that an individual can incur and here is where yogi emphasizes slow motion exercises.

In the laboratory the usual and all round method for measuring efficiency is to have the subject breathe in air from the atmosphere and to expire it into portable bag during the time he is doing work. A set of valves i the tube connecting the mouthpiece with the bah is used for this method of breathing and collection. After the test period, the gas valume is measured and its contents are analyzed for the respiratory gases. It can then be calculated that a certain amount of oxygen was consumed. It is known that oxidation involving a unit of oxygen can perform a definite amount of work. By dividing this value into the work done (which is measured indirectly), experts arrive at the efficiency.

By properly following the yogic exercise, we can check the accumulation of toxic acids and can eliminate them if alredy over-accumulated in the blood itself. The folowing is an extract from a medical hournal: “the cheif killer is a disease known as arteriosclerosis or hardening of the arteries. The arteries become stiffened; their inner walls are lined with a coating of calcium. Sometimes they clog and crack and the person then dies of a stroke. Or they overwork the heart by trying to force blood through tubes narrowed due to calcium deposits and cause heart failure.

It now becomes clear that yogic exercise can help to increase circulation and keep arteries elastic.

Not long ago, a physician made a study of three hundred men and women who had long been victims of chronic fatigue. Some had come to him suspecting that the root of their trouble was infectef teeth, low blood pressure, flat feet. Or anemia. But practically mone suspected what was really causing the fatigue. The doctor found the most common causes of fatigue were heart trouble, diabetes, kidney infections, and glandular disorder. Most of these sympotoms could be easily removed with natural diet, relaxation, breathing and yogic exercises.

The elasticity of the muscles also plays an important part in keeping the body youthful. The abnormal accumulation of fat, which is evenly or unevenly distributed in the muscular system in relation to strenuous exercise or inactivity, results in the hardening of the body's muscular tissues.

Yogic exercises pay great attention to the spinal co;uman and other joints. Morover, they maintain an even supply of blood to every part of the body.

The elasticity of the arteries also plays an important tissues cannot be kept in good condition. For example, the application of a tight bandage interferes with the circulation of the blood, lowers the temperature of the part that is poorly supplied and causes a swelling. In normal cases severe symptoms like swelling may not appear, but the various tissues cannot be kept in a healthy condition and efficiency to carry out various activities alloted to them diminishes without circulation.

Conclusion

Yogic exercise are mainly designed to keep the proper curvature of the spine and to increase its flexibility by stretching the anterior and posterior longitudinal ligaments. The posterior longitudinal ligament extends from the epistropheus to the sacrum. All the discs and edges of the bodies of the vartebrae are attached by this ligament. A fifteen year old can easily touch his toes with the fingertips wile keeping the knees straight. This flexibility of the spine lessens at thirty and continues to decline at forty until at sixty and over, any bending may be difficult and painful. In fact, stiffened ligaments will not stretch at all and body is held at the base of the skull, throughout the spine, pelvis, and knees by ligaments that have lost their elasticity.

A yoga practitioner, even at an advanced age, maintains flexible ligaments and spine. Some of the difficult yogic exercises demonstrate just to what degree the human body can be trained to maintain maximum pliability of the spine and the various joints.