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Assessment Study of Speed and Flexibility among Maharashtra State Level Handball, Football and Basketball Players

Dr. Seema M Harde (Dorlikar)

Abstract
Speed and flexibility are main fitness components, important for success in many sports, especially team sports, like Handball, Football, Basketball The purpose of the present study was to analyse speed and flexibility of Maharashtra State level Handball, Football and Basketball players. Randomly selected 30 Handball players, 30 Football players and 30 Basketball players, who participated at state level competitions held at Indoor, M.P., during the year 2019 and their mean age was 20.6 years with standard deviation of + 1.4 years. The data collected on speed and flexibility were compared for the differences existed among the players using statistical tool ANOVA. The study proved that Football players were fastest, followed by Handball and then Basketball players. The post hoc analysis proved that football and Handball players' were significantly better than Basketball players (P<0.05) There was no significant difference among the players on flexibility. It was concluded that state level Basketball players can concentrate more to improve their speed for better performances.

Keywords: Speed, Flexiblity, Fitness Components, Handball, Football, Basketball, ANOVA etc.

Introduction
Speed is the quickness of movement of a limb, whether this is the legs of a runner or the shot putter's arm. Speed is an integral part of every sport and can be expressed as any one of, or combination of, the following: maximum speed, elastic strength (power) and speed endurance.
Speed is not just how fast someone can run (or cycle, swim etc.), but is dependent on their acceleration (how quickly they can accelerate from a stationary position), maximal speed of movement, and also speed maintenance (minimizing deceleration). Movement speed requires good strength and power, but also too much body weight and air resistance can act to slow the person down.
In addition to a high proportion of fast twitch muscle fibers, it is vital to have efficient mechanics of movement to optimize the muscle power for the most economical movement technique.
Speed is one of the main fitness components, important for success in many sports. For some athletes such as Track and Field sprinters, sprint swimmers, cyclists and speed skaters, speed is the most important aspect of fitness. In many other sports, including team field sports, good speed is also very important as part of the overall fitness profile. A vote of the top sports requiring speed has the obvious ones of track and field sprinters on top. See also another list ranking sports in which speed is important.
In simple term distance covered per unit time is called as speed. The speed is recorded in meter per seconds.
For example:- If an object move 10 meter in 2 seconds than
Speed = Distance /time
S = D/t
S=10/2
S= 5 mt/sec.

In sports the speed may be define as the ability to execute motor action (movement) under given condition in minimum possible time.

In other words speed may be defined as the capacity of an individual to perform successive movements of the same pattern at a fast rate.

Like strength and endurance abilities speed is also one of the important conditional ability which depends upon the nervous system of the body.

Looking into the complex nature of movement of different games and sports/event which required some distance to be covered in the cyclic manner for example 100 mt. Dash but if we thought of boxing where boxer required to perform certain movement with high speed where the sportsman do not need to travel the distance in relation to time. These types of movement are called as acyclic movement. There are certain sports movement like dribbling and jump shot in basketball where both type of cyclic and acyclic movements are required to perform a task.

Flexibility refers to the range of motion around a given joint without pain. Like muscular strength and endurance, flexibility is joint-specific. For instance, you may have very flexible shoulders but tight and inflexible hamstrings or hips.

Flexibility is essential at any age. It plays a role in unhindered movement and can affect your balance, coordination, and agility. Maintaining a full range of motion through your major joints can reduce the likelihood of injury and enhance athletic performance.

Flexibility is defined as the static maximum range of motion (ROM) available about a joint. The largest limiting factor of static ROM is the structure of the joint itself. Thus, even after endless stretching exercise, there will be a limit as to how much movement is available. In addition, joint structures can vary between individuals, and this must be recognised when assessing flexibility standards in athletes. Most of the variability in static ROM is due to the elastic properties of the muscle and tendons attached across the joints. 'Stiff' muscles and tendons reduce the ROM while 'compliant' muscles and tendons increase ROM. It is these elastic properties that are altered after stretching exercises. When a muscle is held for some times under tension in a static stretch, the passive tension in the muscle declines, ie, the muscle 'gives' a little. This is called a 'viscoelastic stretch relaxation response'. Passive tension is defined as the amount of external force required to lengthen the relaxed muscle. Obviously, the less external force required, the more pliable the muscle. This increased pliability is maintained for up to 90 minutes after the stretch.

Flexibility is a kind of motor ability in real sense neither it is a conditional ability nor it is a coordinative ability. Some part of the flexibility depends upon the energy liberation process where as other part of it is controlled and regulated by the central nervous system.

Flexibility may be defined as the ability to perform movement with greater amplitude (wide range) or in other words it may be defined as the range of movement possible around a specific joint.

Stretchability and Elasticity are the qualities of the muscle and ligament by which they stretch and regain to its normal position without any adverse effect.

Suppleness is the ability of the muscle to remain in low tension which helps to perform the movement easily.

Mobility is related to the degree of movement possible in different planes at a joint.

Improving flexibility through stretching is another important aspect for preparatory activity. It has been advocated that through better flexibility a sportsman or a player can achieve the following advantage (importance):-

a) It helps to improve physical performance.
b) (ii)It helps to execute/perform the skills more efficiently and gracefully.
c) It helps in prevention of sports related injuries.
d) It helps to increase elasticity of the muscle and ligaments; hence wider range of motion is possible.
e) Better elasticity leads to forceful contraction.

The Physiology of Flexibility

A number of anatomical and physiological factors influence an athlete's flexibility...

While some we are stuck with (such as age, gender, and joint structure), others are under our control. These include activity level, muscle bulk and stretching exercises.

Joint Structure

There are several different types of joint in the human body. Some intrinsically have a greater range of motion (ROM) than others. The ball and socket joint of the shoulder for example, has the greatest range of motion of all the joints and can move in each of the anatomical planes.

Compare the shoulder joint to the ellipsoidal joint of the wrist. It moves primarily in the sagittal and frontal planes. The hinge joint of the ankle is similar while the modified hinge joint of the knee allows on ROM in the sagittal plane.

Age & Gender

ROM and flexibility decreases with age. This is due, in part to the fibrous connective tissue that takes the place of muscle fibres through a process called fibrosis. Females tend to be more flexible than males. Older individuals should take encouragement that, just as with strength and endurance, flexibility can be increased at any age with training.

Connective Tissue

Deep connective tissue such as fascia and tendons can limit ROM. In particular, two characteristics of connective tissue, elasticity and plasticity are related to ROM. Elasticity is defined as the ability to return to the original resting length after a passive stretch. Plasticity can be defined as the tendency to assume a new and greater length after a passive stretch.

Ligaments do not seem to display any elastic properties. However, with exposure to stretching they may extend to a new length. The strength and conditioning coach must remember that increased mobility in the ligaments reduces the stability of the joint - often an unfavorable adaptation, particularly in contact sports.

Muscle Bulk & Weight Training

Hypertrophy of skeletal muscle can adversely affect ROM. It may be difficult for very bulky athletes to complete certain stretches such as an overhead triceps stretch. However, in these athletes, significant muscles mass is usually move favorable to their sport than extreme ROM.

Resistance training can increase flexibility although when heavy loads are used within a limited ROM, weight training can reduce flexibility.

Proprioceptors

The capacity of the neuromuscular system to inhibit the antagonists (those muscles being stretched) influences flexibility.

There are two important proprioceptors involved in the mechanics of stretching and flexibility. The first is the muscle

spindles. Located within the muscle fibres they monitor changes in muscle length. The stretch reflex is the bodys involuntary response to an external stimulus that stretches the muscle and causes a reflexive increase in muscular activity. It is the muscle spindles that activate this response.

When stretching, it is best to avoid this activating the muscle spindles and the stretch-reflex response, as it will limit motion.

Static stretching does not elicit the muscle spindles, allowing muscles to relax and achieve a greater stretch.

The other important proprioceptors are the golgi tendon organs (GTO). These are located near to the musculotendinous junctions and are sensitive to increase in muscle tension. When the GTO is stimulated it causes a reflexive relaxation in the muscle. When this relaxation occurs in the same muscle that is being stretched, it is referred to as autogenic inhibition and can facilitate the stretch.

Autogenic inhibition can be induced by contracting a muscle immediately before it is passively stretched a technique used in PNF stretching.

Reciprocal inhibition occurs when the GTO is stimulated in the muscle opposite to that being stretched (i.e., so the opposing muscle relaxes). This can be achieved by simultaneously contracting the opposing muscle group to the one being passively stretched.

Internal Environment

The athlete's internal environment affects ROM. For example, mobility is decreased immediately upon waking after a night's sleep. Ten minutes in a warm (40ºC) bath increases body temperature and ROM.

Previous Injury

Injuries to muscles and connective tissue can lead to a thickening, or fibrosing on the affected area. Fibrous tissue is less elastic and can lead to limb shortening and reduced ROM. Fibrous nodules in connective tissue and muscle are often called trigger points. A technique called myofascial release may be able to alleviate pain and restriction casued by trigger points.

The relationship between static range of motion (ROM) and passive tension has been further supported by McHugh *et al*. (1998) [6]. Research into the effects of flexibility of stretch shortening cycle (SSC) movements has shown that increased flexibility is related to augmented force production during SSC movements. In contrast, running studies have shown that flexibility has little performance effect, which is odd because running is a kind of SSC movement. For example, De Vries (1966) [4] showed that while pre stretching increased static ROM in sprinters, it had no effect on speed or energy cost during the 100-yard dash. It has been shown that stiffer leg muscles in endurance athletes may make them more economical in terms of oxygen consumption at sub-max speeds. The reason for these converse findings is probably related to the principle of specificity, which seems to underlie all sports training. Research by Iashvili (1983) [5] found that active ROM was more highly correlated with sports performance. Due to varied sports specific training for Handball, Football and Basketball players, that involved different types of stretch shortening cycle movements that increased flexibility and stiffer leg muscles depending of their nature of play. This research was intended to find out how for these sports trainings influenced the Maharashtra State level Handbaall, Football and Basketball players' speed and flexibility.

Methodology

To achieve the purpose of this study, the investigator randomly selected 30 Handball players, 30 Football players and 30 Basketball players, who participated at State level Competitions held at Indore, M.P., during the year 2019 and their mean age was 20.6 years with standard deviation of + 1.4 years. Data were collected from the subjects, their speed through 50 M sprint and flexibility through sit and reach tests. The data were compared for the differences existed among the players using statistical tool ANOVA and Scheffe's post hoc means where significant F value obtained..

Results

The descriptive statistics on speed, consisting, mean, standard deviation and range among Handball, Football and Basketball players are presented in Table 1.

Table 1: Descriptive Statistics, Mean (M), Standard Deviation (s), and Range of Handball, Football, and Basketball Players on Speed and Flexibility

Variable	Player	M	σ	Range
	Handball	8.01	0.69	6.93 – 9.8
Speed	Football	7.87	0.78	6.36 – 9.72
	Basketball	8.49	0.83	7.00 – 9.90
	Handball	13.60	2.13	9.00 – 18.00
Flexibility	Football	12.97	1.61	11.00 – 16.00
	Basketball	13.00	1.70	10.00 – 16.00

The results presented in Table 1 proved that there were differences in speed and flexibility of the Handball, Football and Basketball players. To find out the statistical significance of the differences among the selected groups, ANOVA was employed and the results presented in Table 2.

Table 2: Differences in Speed and Flexibility among Handball, Football and Basketball Players

Variables	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
	Between	6.38	2	3.19		0.05
Speed					5.40	
	Within	51.43	87	0.59		
	Between	7.62	2	3.81		
Flexibility					1.14	NS
	Within	290.17	87	3.34		

The results presented in Table 2 proved that there was significant difference on speed among Handball, Football and Basketball players and there was no significant difference among the groups on flexibility. Since significant F values were obtained on speed the results were further subjected to post hoc analysis using Scheffe's post hoc interval test and the results presented in Table 3.

Table 3: Multiple Comparisons of Paired Means on Speed among Handball, Football and Basketball Players

Handball Players	Football Players	Basketball Players	MD	CI
8.01	7.87		0.14	0.47
8.01		8.49	0.48*	0.47
	7.87	8.49	0.62*	0.47

* Significant

The results presented in Table 3 proved that paired mean comparisons between Handball and Basketball players; and Football and Basketball players were significant. There was no significant difference between Handball and Football players on speed.

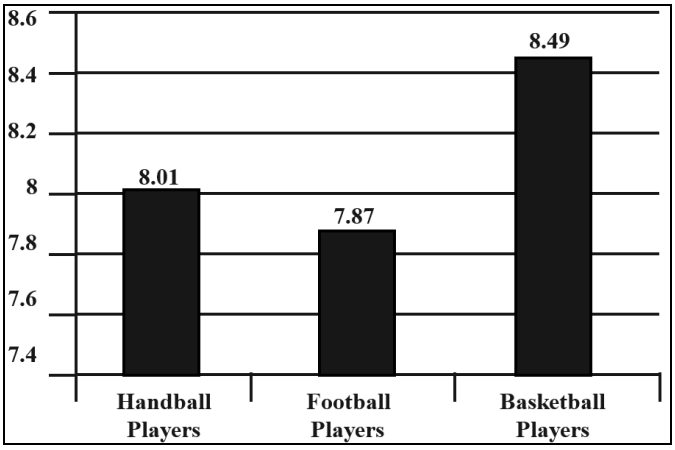

Fig 1: Mean Values of Speed of Players Compared

Discussions

The results presented in this study gave way for consideration that the difference in speed among Handball, Football and Basketball players as the obtained F value was significant P < 0.05. The paired mean comparisons proved Handball and Football players' were faster than Basketball players. This may be due to the fact that Football and Handball players involve themselves in more running during their game situations than Basketball players. The study proved that there was no significant differences among Football, Handball and Basketball players on flexibility as all these players were involved in active games which resulted in adequate stretch shortening cycles, which in turn provided them equal range of motion and improved flexibility. The findings of this study are in agreement with the findings of De Varies (1966) [4] and Iashvili (1983) [5].

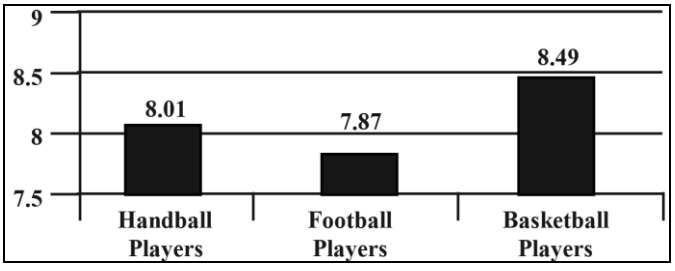

Fig 2: Means Values of Flexibility of Players Compared

Conclusions

The study proved that though there seem to be differences in speed among Handball, Football and Basketball players there was no significant differences among these players on flexibility. It was concluded that the players can improve their speed for improved performance.

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