INTRODUCTION

Today, sports and Physical Education are considered as a great forced Contributing to international; understanding and universal brotherhood. In the present politically conflicting times, the sports are also considered as one of the major adhesive forces in developing world peace.

Therefore, stresses on the promotion of physical education and sports from pre-schools to old age should be treated as one of the fundamental human right by national government.¹

Sports are one of the avenues for mankind, never ceasing to strive for excellence. Its uniqueness lies in the intimacy between the physical happenings of our bodies and their repercussion on our minds as well as in the general recognizability of the social and aesthetic values which sports engenders.

Anthropological and historical research has established that physical recreation and sports have been fundamental aspects of all cultures throughout the history of the world.²

Today the preparation of an athlete for top-notch achievement is completely dynamic state characterized by a high level of physical and Psychological efficiency and degree of perfection of the necessary skills and knowledge, teaching and tactical preparation.

An athlete arrives at this stage only as a result of corresponding training. Thus, athletes training today is a multisided process of expedient use of aggregate factors so as to influence the development of an athlete and ensure the necessary level of participation.⁴

Conquering is a form of achieving and appears to be a natural goal; winning is a form of conquering and is glorified, sometimes out of proportion to its real significance. The urge to surpass, surmount and excel is characteristic of almost everyone and is natural form of motivation. In sports it has become an accepted practice to strive to win. The philosophy of sports participation has undergone a change as how an individual participates to win even his countrymen induce the sportsmen to win as sports has become a prestigious aspects to prove their superiority. This is contrary to earlier philosophy that is, “play the game for the sake of participation.”⁵

By definition, sportsman is one who challenges himself to show superior ability in tasks which do not best on any benefit other than the spiritual satisfactions of achieving something which was not achievable till when by the individual concerned.⁶

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Winning laurels at international sports area has become a prestige issue linked with political system and as such nations vie with each other to produce top class sportsmen for international competitions. For this scientific research is systematically conducted to identify the factors that help in achieving level of skill which a player can attain through proper coaching and evaluation.\(^6\)

Competitive sports make a tremendous demand on the physical condition, physical fitness and mental power of the participant. Only athletes or sports or women in the finest condition may withstand the wear and tear of the competitive season. Only the fittest can play to be best of his ability.

“Behind every super-performance lies a life time of discipline, consuming passion and unique talent. All three are essential for changing the horizons of games and sports”.

No two persons are identical in this world. Individuals differ in mental abilities, physical abilities and personalities traits. The individuals not only differ from one another but also differ from one ability to another within their own self. Thus there are differences in individuals as well as with in the same individual regarding various abilities.

In order to train a champion sprinter, the physical education teachers and coaches have to make a right choice in the selection

of the athletes and than train them employing the best methods of training and coaching so that increase in performance capacity may be guaranteed. These dual efforts of channeling potential to the most suitable games or sports of selecting suitable players is helped to a great extend by the recent development in anthropology as it applied to sports and games and construction of objective and valid tests of fitness and skill.\textsuperscript{7}

Champion performance is not something that just happens many coaches have explained the secret of a champion athletes than they have developed through systematic conditioning and well planned training programmes. The success in competitive sports calls for maximum fitness.

A competitive sport is a place where the young and super challenging athletes fight for supremacy and records. The athletes are sophisticatedly prepared by expert sports scientists and coaches to tussle among themselves, hence to win and then to enjoy their dreams and fruits of the efforts put in for years together. The fact is that today’s athletes are simply stronger, faster and more efficient then yesterday’s and tomorrow’s may be still better.

Competition is one of the out growths of matter in life. It is a natural human activity, which is in enable in life, and the education process should assist in the preparation of individuals for the battle of life. Competition provides the means by which one can show one’s worth through success.\textsuperscript{8}

\textsuperscript{7}Harold M. Barrow and Rosemary McGee, A Practical Approach to Measurement in Physical Education 3\textsuperscript{rd} ed. (Philadelphia : Lea and Febiger, 1979), p. 111

Optimum performance can only be recorded in a competition. After all, there are no awards offered for world records in training. The athlete prepares to improve his competitive performance and therefore, all the training is a pursuit towards this end. The concept of periodization implies producing and reproducing the high point of performance in a particular competition. This has become very essential and rather complex phenomenon in the light of increased number of competitions and political, economic and social implications besides the glory of victory attached to each one of such competitions.

Training and competitions aim at raising the standard of athletic performance. Competitions are the most scientific application of training.

Competitions are of great significance for the build up distinctiveness of the competitions performance. Preparatory or build competitions are a part of training, where as main or major competitions is an end in itself within on training cycle. Preparatory competitions are intelligently spaced within the training cycle to enable the athlete to progressively achieve his peak performance in main competition. The ultimate aim is to improve the abilities, skill and mental qualities that determine performance and hence, are important load forms. Nevertheless, a mere practice trials in training sessions will not inculcate the mental qualities. The competitions are organized to stimulate the actual competitive
situations, those put the best demands on the athlete causing development of mental qualities such as aspiration, anxiety, confidence and competitive urge.

Competition is one of the outgrowths of modern society. It is the challenge, which stimulates, inspires and motivates men and women to sweat and run faster, jump higher, throw farther and exhibit greater strength, endurance and skills to exhibit supremacy over the others. Every individual or a team that participates in any sports/games wants to win as our society attaches a great significance to winning. According to Renwes\textsuperscript{9} “performance is the key note of all sports its basic principles, since sports have become prestigious aspect to prove once superiority, the philosophy of participation in games and sports has undergone a great change.”

Training in games and sports is no longer a myth and it has no casual approach, but it provides opportunities for scientific process and verification. Training has been accepted as a highly specialized science involving the use of scientific methods and physical investigations.

In games and sports, systematic training and conditioning of sportsmen play vital role in building up peak performances. Therefore, specific training in games and sports has become a necessity for superior performance.

\textsuperscript{9} J. Renwes, \textit{Human Performance} (Balmont: California’s Books/Cole, 1972), p.73.
Today, there is not a single sport in the world at competitive level for which resistance training in some form or other is not used as a conditioning exercise. The day of general fitness training for top class sports are as much in the past as the scores of records that have been broken in recent years by athletes using more specific training methods. It is now recognized that muscular strength is the foundation upon which first class performance is built.\footnote{Eric Taylor, \textit{Training With Weights} (London: John Murray Ltd., 1962), p.4.}

Bosen says, “success in all athletics is concerned with strength and speed of movement” all these factors are very much related.

In sports and games conditioning and training play vital roles in the improvement of human performance, especially at the competitive levels. Therefore, specialized training in sports and has become necessity for superior performance.\footnote{Fred Wilt, \textit{Run Run Run} (California : Track and Field New Inc., 1971), p.256.}

In recent years greater stress has been laid on the quality rather than the quality of training. The sports scientists and experts of sports want their sportsman to extract maximum achievement for their training procedures without causing too much strain on them. This is possible only if coaches and teacher of Physical Education apply the performance of the athletes.\footnote{Asha H. Patel, “The Effect of Varied Frequencies, Speed Training on Sprinting Speed,” (Unpublished Master’s Thesis, Jiwaji University, 1980).}
Physical Education scientists are striving to understand the various factors affecting skeletal and muscular activity, during a variety of human movements with the help of electromyography and are engaged in analyzing the biomechanics of the performance of top athletes by focusing their attention upon the analysis of sports skills. They are consistently studying factors like strength, limb length, mass, inertia proportions and angular and linear velocity, that influence these movement to get a better insight into the complexities of human motion and performance. The latest approach is aimed at the construction of a mathematical model of a skill in a form which is suitable for computer analysis so that it could be stimulated under several carefully controlled conditions for predicting more effective techniques for higher performance.

The standard of performance has been showing improvement and more and more records are being created in the events included in the Olympic and the world championships. To a certain extent this is due to improvement in track surfaces and the equipment but to a greater degree these achievements have been made possible due to improvement in the methodology of training and coaching.

“Speed in training theory is defined as a capacity of moving a limb or parts of the body’s lever system or the whole body with the greater velocity.”

Speed is not only necessary in sports activities where man compels to show his superiority but also in activities with which

nature has blessed mankind. Speed is the rapidly with which one repeats successive movements of the same pattern. Great speed is muscle contraction is not always conducive to the greatest efficiency of movement. It seems that there is an optimum speed at which muscle contract with the greatest conservation of energy for the amount of work done.

Sprinting is the fullest form of running, performed over short distance in which maximum or near maximum effort can be sustained.

Sprinting figures in the programmes of all major athletics championship including the Olympic games, in which the standard sprint events for men and women are the 100,200,400 meters and hurdles and 4x100 meters and 4x400 meters relays. There were no sophisticated training means for the development of sprinting speed and athletes used to exhibit what ever they gained through daily physical work and what ever speed characteristics they inherited from their parents. As the saying goes that sprinters are never made, they are born. This saying is now being modified to indicate the sprinter is born with some inherent speed but he can be shaped as a still better runner as a result of systematic and scientific training. In 1890, the worlds fastest human was John Owen, who ran 100 yards dash in 9.8 seconds. The 9.4 seconds 100 yards dash performance by George Simpson (1929), Dam Joubert (1931) and Josse Owens (1933) were truly feats in athletic area. Even more outstanding is the 10.2 seconds 100 meters world record set by Jesse Owens in 1936, which for more than three decades remained unbroken. In 1968 Jim Hines of U.S.A
surprised the world with a 100 meters performance of 9.95 seconds in Mexico Olympic Games. In 1983 in Helsinki world cup athletics another U.S.A sprinter Kelvin Smith stunned the world with a performance of 9.93 seconds. After one year Carl Lewis of U.S.A was almost near the mark with the performance of 9.99 seconds at Los Angeles Olympic Games.

The glorious 100 meters sprinting re-wrote the history in 1987 World athletic Championships when Canadian Ben Johnson breasted the tape with a cracking time 9.83 seconds (world record) and just behind him the hero of 1984 Olympic Champion Carl Lewis with a creditable time of 9.93 seconds.\(^{14}\)

The two major factors that also determine the sprinting speed of an athlete are stride length and stride frequency.\(^ {15}\)

Whitehead\(^ {16}\) expressed his strong belief in acceleration runs for the development of speed. He suggested that an athlete should run a distance of about 80 meters 3 to 4 times gradually increasing his speed, repeating this in or three sets of four repetition, thrice a week in competitive season. This will bring about winning results. As running shorter distance with maximum effort requires an aerobic capacity. Speed of acceleration and sprint endurance, all these characteristics are improved by acceleration. Therefore, now-a-days acceleration runs are used by most of the coaches and physical education teachers to train their athletes for speed.


In sports activities some amount of resistance (if not external than one's own body weight) has to be overcome. The strength therefore, is an important factor on which the sports performance depends. Depending upon the magnitude and type of resistance to be tackled in various sports, the sportsmen of different sports need different levels and types of strength to achieve good performance. The greater, the resistance, the stronger should be the sportsmen. Strength is needed not only for competition but also for successfully carrying out the training programmes. A high level of speed, endurance, techniques, tactics and other coordinative abilities is impossible if the sportsman lacks the requisite amount of strength.\(^{17}\)

Other forms of resistance running include harness running, running in heavy boots, running with sacks of sand on the back and running with weighted belts. Basically the athlete performs the movements with a belt secured about the waist. The belt is attached to ropes, which are held by the partner, who provides a resistance proportionate to their being effective movements coming from the performer. Harness runs can be performed for a period of time or for a distance. It is most helpful if the coach can apply the resistance as he can place certain emphasis on movement by calling to the performer from behind e.g. greater ankle extension, higher knee lift etc. The resistance does not have to be applied by a partner. It can be applied by weighted sleights.

which have the advantage that degree of resistance can be measured and standardized.\textsuperscript{18}

The best way to develop strength is through an organized programme of weight training. Today only a small number of coaches are using weights on an organized basis to supplement their athletic programmes.\textsuperscript{19}

One should remember that weight training is not a substitute for athletics, but merely and adjunct which can be conveniently used, especially off season, weight training may even be done without weight.\textsuperscript{20}

Creek\textsuperscript{21} explains that like all the athletics skills, sprinting demands efforts plus style and good style involves the study and practice of techniques. While maximum effort depends upon will power and stamina. Good style is the result of intelligent training and coaching, coupled with a sound knowledge of the event and of course a high degree of natural ability.

The only way to develop pure strength is through a form of progressive resistance exercise using weights or some other forms of resistance. At the moment most track and field athletes use

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\textsuperscript{21}F.N. Creek, \textit{Teach Yourself Athletics} (London : English University Press Ltd., 1968), p. 16.
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barbell etc. with disc as the common method for applying a resistance.
In training with weights the load on the muscle can be recorded accurately. The number of repetitions or the durations of the overload effort can be controlled and accurately recorded, as well as the frequency of the training sessions.\(^{22}\)

It is probably safe to say that there are no sports today that do not boost of weight training athletes. Even distance runners and others to whom economy of body weight is vitally important have found that work with weight training apparatus will improve chronically weak muscle group and result in better and more injury free performance.\(^{23}\)

Weight training is not usually thought as an end in itself but as a means to an end. The primary objective is not to learn to lift as much weight as possible but to increase strength and powerful application to some other sport. Weight training may be either of isometric contraction, isotonic or isokinetic contraction.

Heighton\(^ {24}\) opinion that if speed is to be developed, strength development is must because once strength is developed up to some extent as strength is a must to perform any type of activity. He suggests weight training as a better method for development of speed, agility and endurance.

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\(^{22}\)Hooks, *Application of weight training to Athletics*, P.19.


Hooks suggested different weight training programmes for different sports like track and field events, basketball, football, swimming etc. taking in account their different requirements of fitness.

Uphill running improves speed through an increase in the rate of leg movement, leg strength and power and physical endurance. It can serve Uphill running improves speed through an increase in the rate of leg movement, leg strength and power and physical endurance. It can be serve as a training supplement or part of the regular programme especially during off-season training.

The heel should be graded between 15 and 30 degree and anywhere in length from 40 to 60 yards. It is best if the hill can be circuited, so the runner need not stop or change direction.

Strength is defined as the capacity to exert force or as the ability to do work against resistance. Therefore, strength training programmes should observe the following principles if maximum benefit in terms of improved sprinting speed and performance are to be attained.

1. Since muscle shortening (Hamstring in particular) does occur after heavy resistance work, a series of stretching exercise should always follow each work out.

2. Strength training should be used in conjunction with actual sprint training, both in season and off-season, rather than as a replacement for sprint training. When two programmes are used simultaneously sprinting speed is significantly improved.

3. Contraction is placed upon the muscle (Upper and lower torso) involved in the running action. Exercises are then chosen to activate and strengthen these muscle groups.

4. General principles of conditioning must be followed with the hypertrophy cycle providing enough rest between workouts to allow maximum exhalation or regeneration that elevates conditioning beyond the pre-exercise level. Alternate day programme are used only for sprint training, flexibility exercises form training, stride training and other special supplement programmes.

5. If speed is the desired outcome exercises must be performed explosively.

6. Heavy resistance exercises, such as weight training be follow the sprint training session or formal practice in track and field, football, basketball, soccer and baseball.

7. Injuries are linked with un-even development of agonist and antagonist muscles. Sprinter should avoid strengthening one sided development (agonist) and must find an optimal balance in
strength and power training for both agonist and antagonist muscle groups.\textsuperscript{27,28}

Some successful athletes of the world toiled and trained hard to get their picture on page one of the newspaper, or on the first covers of popular magazines. This inflates and briefly tililated their ego, but it never satisfied them for long. Still there is no limit to their progress, with a growing inner hunger to reach the unreached. So they are restless and discontented. Similarly, there is nothing that the public forgets so quickly as yester’s Olympic news.

In reviewing the progress in the sprinting and analyzing the training method of sprinting the following attract attention:

1. The functional and competitive structure of sprinting is usually divided in three important variables i.e. speed, strength and endurance. Unfortunately, the correlation between the three forms remains unsolved. Some researches claim that such correlation exists and other deny it.

2. Opposing opinions are also common regarding the question of the development of general and specific speed. This is mainly concerned with transfer ability of general speed to a specific action which considering that some speed exercises could have negative effect whereas some strength of endurance exercises might influence positively the motion structures.


3. The exact requirement of speed training, strength training and endurance training for sprinting competition structures appears to be controversial and hence requires systematic investigation.

4. The latest development of new speed level by using the stimulus of changing conditioning is not to be overlooked. This can be achieved by setting new levels at assisted running (down hill) resisted running (up-hill, dragging etc.) or being trained with mechanical resistance (weight training or multigym exercise) and to avoid fatigue during competition a proportionate amount of endurance training is a great requirement.

Therefore it appears that there are still many gaps in the theory of speed training for better sprinting performance and until these are filled, significant improvement in sprinting performance can not be achieved.

Hence the research scholar felt the need to investigate the comparative effects of different training methods (sand running, weight training, uphill running, harness running) dominated by speed, strength, speed endurance and sprinting speed.

**Statement Of The Problem**

The purpose of the study was to compare the effectiveness of sand running, weight training, uphill running and harness running on sprinting speed.
Delimitations

1. The study was confined to the female students of the Bundelkhand University, Jhansi, Uttar Pradesh.

2. The study was further delimited to the females in the age group of 18 to 22 years.

Limitations

1. As the subjects selected for the study were day scholars, certain factors like diet, daily routine, life style, habit etc. which might have an effect on the result of the study could not be controlled and hence no attempt was made to control these factors.

   However, it was assumed that the random selection of the subjects assured the nullifying affect on these factors.

2. The experimental period was 12 weeks only, which was considered adequate to indicate the training effect on sprinting speed.

3. No special motivation was provided to the subjects, however, they were requested to put in their best. The difference in the performance due to lack of motivation was identified as a limitation of the study.
Hypothesis

It was hypothesized that there would be an improvement in sprinting speed by employing different resistance means i.e. Sand running, Weight training, Uphill running and Harness running.

Definition And Explanation Of Terms

Sand Running

For the purpose of this study sand running may be defined as one of the training means in which an athlete make a proper body lean and running action on the sand.

Weight Training

This term refers to the exercise phase of the activity where weight, in the form of barbells and dumbbells, is used to condition and alter the size of various segments of the body. This is undoubtedly, the most popular phase. Here the under developed individual strives for average or about average size in terms of muscular bulk and body weight and size, the athletes strives for increased strength and condition to become a better performer in chosen sports.  

Weight training is defined as those exercises that are designed to strengthen specific muscle by causing them to overcome a fixed resistance, usually in the form of a barbell or dumbbells.\(^{30}\)

**Intensity**

It is the weight percentage used in strength training in relation to maximum performance capacity. Absolute strength indicates the 100 percent intensity.

**Duration**

It is in terms with total stimulus of the strength for a particular training session. Time utilized in each set may be added to find the sum.

**Density**

It is donated by the recovery intervals in between the sets and also for the change of the exercise.

**Number Of Sets**

Each exercise is performed with a few numbers of sets for a through build up of a particular muscle group.

Training

Training is a programme of exercise and other physical activities designed to improve physical development and condition and performance in motor skill.\(^{31}\)

Harness Running

For the purpose of this study harness running may be defined as one of the training means in which resistance to be carried by the subjects is in the form of dragging weight.

Speed

Speed is the ability or capacity of an individual to perform successive movements of the same pattern at fast rate.\(^{32}\)

Sprinting Speed

Sprinting speed can be defined as the ability to perform energetic movement at maximum speed over a short distance.\(^{33}\)

Significance Of The Study

The world of games and sports is ever expanding and progressing


\(^{32}\text{Harold M. Barrow, Man and His Movement Principles of His Physical Education (Philadelphia: Len and Febiger 1971), pp.172-173.}\)

\(^{33}\text{Ibid.}\)
outlook. It is not confined to “what has been” its target is to march ahead.

Through different types of researches and scientific advancement in general and their application in the field of sports in particular games and sports have undergone revolutionary changes and crossed many milestones.

The main factor responsible for this improvement is the development of new training methods based on scientific principles.

Sprinting speed has varied application in the field of games and sports. Particularly in short distance races and horizontal jumps. The speed is a vital factor in winning.

The coaches and physical education teachers for quite some time have been trying to find out the way and means which will help them to train most economically and efficiently keeping the importance of sprinting speed in games and sports, particularly in short distances. The research scholar felt the need to investigate the comparative effects of different training methods, sand running, weight training, uphill running and harness running dominated, by speed, and explosive strength training on sprinting performance.

For the reasons stated above the result of the study may be of vital importance in the following ways:
1. The study will help the teachers of physical education and coaches by informing them about the training effects produced by the different training means i.e. Sand running, Weight training, Up hill running, Harness running.

2. The result of the study might reveal which of the training means employed in the study are superior to the others in improving sprinting speed.

3. The findings of the study might highlight differential effects produced by the four types of training methods, selected for this study on sprinting speed.

4. The physical education personal and coaches will be able to select as to what type of training will be best suitable for their athletes.

5. Based on the result of the study, teachers of physical education and coaches will be able to organize their training programme effectively.