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INTRODUCTION
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Though many athletes compete in sports, only a few reach the highest performance level. Certainly not every one has the same potential in the beginning. Even so, many athletes, who seem only ordinary in their early years, latter blossom into national or world class performers. What makes them able to reach the top, when initially more talented athletes are lacking behind in training. Both training and techniques are essential in improving sports skill levels. The human body is a self optimizing machine. It gradually adapts to a given movement challenge by improving the efficiency with which the movement is performed. Peak physical performance is essentially the result of a balance between natural abilities and proper training.

Hockey is a fast and furious game of remarkable complexity, and the variety of skills displayed can confuse even the most knowledgeable spectator. At the highest level, these movements are the result of years of painstaking practice by players who have made many sacrifices in the interest of the sport to reach the game's premier stage. However, one of the truly great things about the game is the fact that it can be enjoyed by almost everyone with an interest in sporting activity.

Hockey at any level is a thrilling game enjoyed by players of all ages. The vast majority plays the game primarily for social reasons and do not normally have the opportunity for the sort of coaching that
could significantly improve both their individual skills and overall performance (Taylor Ion, 1988).

The major objective in training is to cause biological adaptations in order to improve performance in a specific task. To enhance physiological improvement effectively and to bring about a change, specific exercises and overload must be followed. By exercising at a level, normally a variety of training adaptations take place in the body that makes it function more efficiently. Numerous training procedures are in practice to improve each and every physical and motor fitness quality at various levels. These basic training procedures will serve better when utilized with modifications suited to the individual or a group to deal with. The best training programme is that which increases the desired quality at a higher rate without causing unwanted effects.

Training induces physiological changes in almost every system of the body, particularly within the skeletal muscles and the cardio respiratory system. The changes resulting from training are influenced by the frequency, duration and, particularly, by the intensity of the training program, and by heredity. The effects of training are specific to the type of exercise performed, the muscle groups involved, and to the type of training program used. The specificity of training and exercise has two broad physiological bases, metabolic and neuromuscular. The effects of training are lost after several weeks of detraining. Training effects can be maintained with maintenance
programs consisting of one or two days of exercise per week. Previous training does not significantly influence the magnitude or rate of gain of training effects induced by subsequent training program (Fox L. Edward and et al., 1984).

A typical field Hockey player must train for many years to refine the technique and to develop physical fitness factors especially strength, endurance and speed to reach his individual potential. There are many types of training by which an athlete can improve the above said bio-motor qualities.

Field Hockey is considered to be an endurance event. Various skills in field Hockey demand display of specific strength and endurance. A definite degree of strength of arm muscle is required to do the basic skills like hitting, pushing, and scooping. Hockey requires a higher degree of running ability. The extension of the Hockey field is so large that the players are able to run in the whole field without fatigue and compete with their opponents. The quality of muscular endurance and cardio respiratory endurance is highly required for a Hockey player to improve his performance. There are trainings like circuit and weight training to develop and improve strength and interval and resistance training to improve the speed. Circuit training has proved to be a very effective method for improving strength endurance (Don Cash Seaton et al., 1983).
Training is not a recent discovery. In ancient times, people were systematically trained for military and Olympic endeavours. Today athletes prepare themselves for a goal through training (Todor O. Bompa., 1999).

Training represents a long term endeavour. Athletes are not developed overnight and a coach cannot create miracles by cutting corners through overlooking scientific and methodical theories (Todor O. Bompa., 1999).

Sports training is done for improving sports performance. The sports performance, as any other type of human performance, is not the product of one single system or aspect of human personality. On the contrary, it is the product of the total personality of the sports person. The personality of a person has several dimensions e.g. physical, physiological, social and psychic. In order to improve sports performance, the social and psychic capacities of the sports person also have to be improved in addition to the physical and physiological ones. In other words, the total personality of a sportsman has to be improved in order to enhance his performance. Sports' training, therefore, directly and indirectly aims at improving the personality of the sportsman. No wonder, therefore, sports training is an educational process (Hardayal Singh, 1991).

Scientific training methods and application of basic principles of body mechanics in sports skill have been attributed to the higher level of performance in sports skills. Performance is the
combined result of coordinated exertion and integration of a variety of functions. Genetic factor probably plays an important role in an individual's performance. It appears that up to seventy percent of an individual's maximal force, power or capacity is a matter of genetic factor. The environment as well as geographic location play an important role in performance. Moreover, performance to a certain extent depends upon the physical and motor fitness qualities in which definite improvement can be achieved through appropriate training (C. Bourchers and R.M. Malina, 1999).

Performance can be increased or improved to a great extent only by causing biological adaptation and this is possible only through systematic and scientific training. Specificity of exercises and overload principle should be followed in order to enhance the functioning efficiency of the various systems of the body. Numerous training procedures are in practice to improve motor fitness ability at various levels.

Sports training is a programme of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event. These basic training procedures will serve better when utilized with modifications suited to individuals or a group dealt with. The training programme should look into improving the performance of the athletes and at the same time should prevent injury from taking place (Edward L. Fox, 1984).
Sports training is a basic preparation for better performance through physical exercise. It is based on scientific principles of aiming at education and performance enhancement. Sports activities consist of motor movement and action and their success depends to a great extent on how correctly they are performed. Techniques of training and improvement of tactical efficiency play a vital role in a training process (Edward L. Fox, 1984).

The main components which influence the physical performance of an athlete are strength, speed, agility, endurance, power and coordinative abilities. Action potential depends on natural abilities and at the same time fundamentals act as the foundation for excellence.

A different kind of training program that would be effective in preparing athletes for competition is circuit training. This type of program consists of a number of stations where the athlete performs a given exercise, usually within a specified time. Once the exercise is completed at one station, the athlete moves rapidly to the next station, performing another exercise. The circuit is completed once the athlete has performed the exercises at all stations. The exercises at various stations consist mainly of weight - resistance exercises, but running, swimming, cycling, calisthenics, and stretching exercises also may be included. Circuit training, therefore, can be designed to increase muscular endurance, flexibility, and if running, swimming, or cycling is involved, cardiorespiratory endurance as well.
A circuit should include exercises that would develop the particular capabilities required in the sport for which the athlete is training. Regardless for which sports the circuits are designed, they should consist of between 6 and 15 stations, requiring a total time of between 5 and 20 minutes to compete. Usually, each circuit is performed several times in one training session. Only 15 to 20 seconds should be allowed between stations. For weight resistance stations, the load should be adjusted so that the working muscles are noticeably fatigued after performing as many as repetitions as possible within a designated time period. This load should be increased periodically in order to ensure progressive overload. In addition, the sequence of exercises should be arranged so that no two consecutive stations consist of exercises involving the same muscle groups.

As previously mentioned, circuit training may be designed to increase muscular strength, muscular endurance, flexibility and cardiorespiratory endurance. However, it should be emphasized that the physiological effects, to a large extent, depend upon the type of circuit that is set up. For example, it has been shown that some circuits consisting only of weight resistance exercises produce substantial gains in strength but only minimal gains in cardio-respiratory endurance. Although an increase in cardio respiratory endurance can and does result from circuit training, especially when endurance activities are included in the stations, the magnitude of the increase is generally not as great as that from endurance programs consisting entirely of running, swimming or cycling.
The use of circuit training, particularly for off-season programs, may be recommended for athletes whose sports require high levels of muscular strength, power and endurance and cardio respiratory endurance (Bowers, Richard W. and Fox Edward L., 1992).

The performance of any game depends upon physical fitness of the players even though proficiency in fundamental skills and other variables play an important role. Hence, it becomes necessary to explain the Bio-motor variables and its significance.

The general motor ability has been considered as one's level of ability in a wide range of activities. It has been thought of as an integrated composite of such individual traits as strength, endurance, power, speed, agility, balance, reaction time, and co-ordination underlying performance in many motor complexes.

The term 'motor' refers to movement whereas the prefix 'bio' is added to illustrate the biological importance of speed, strength, and endurance abilities.

The game of Hockey nowadays is being played in many types of surfaces namely grass, gravel and artificial surface. After the introduction of the artificial surface, the player, coaches and the conditioning experts now understand that the physical variables are playing vital role to reach high level performance in the artificial surface. All the major tournaments like Olympics, World cups, Asian games, champion's trophy, and commonwealth games are being played
only in the artificial surface. Playing in the artificial surface requires high level of physical efficiency, especially in speed, agility, power and endurance. Among the many physical variables, the investigator felt and experienced that the physical variables namely speed, power, agility and cardio respiratory endurance are more important and hence had selected those as Bio-motor variables for this study.

Speed is the performance pre-requisite to do motor actions under given conditions. (movement task, external factors, individual pre-requisite) in minimum time. Speed is a determining factor in the explosive sports such as sprints, Jumps, and most field events (Hardayal Singh, 1991).

Speed is one of the most important physical fitness components which are highly essential for many physical activities. Strength is highly related to speed. Generally in team events with higher speed and strength which because they are the fastest team. Speed of muscle.

The power of muscle contraction is different from muscular strength. Power is determined not only by the strength of muscle contraction but also on its distance of contraction and the number of times that it contracts each minute. Muscle power is generally measured in Kilogram meters per minute.

Power plays a major role in all the competitive sports. In Hockey, power has been considered as a more important variable equally
with other Bio-motor variables. After the introduction of the artificial surface, the competition rules for Hockey are also changed. All the major tournaments like Olympics, World cup, Asian games, Asia cup, Common Wealth games and SAF games are played only in the artificial surface. The Hockey players must have sufficient power to execute all the skills at any time in any situation. More power is required to play in the artificial surface (Harrold M. Barrow and Rosemary McGee, 1973).

During the game, players run fast to receive the ball in gap and sometimes to create space. To speed up the game, players must have good power with speed.

Modern Hockey requires speedy players with sufficient power. To score a goal, players must have good power so that they play the ball in the goal with more speed. For a long clearance, to take free hit, hit in or 16 yards free hit, players should have optimum power to achieve their ultimate aim. In modern Hockey, the results depend upon the penalty corner conversion. Most of the European countries use to score goals through penalty corners much more easily. European countries use to train specialist to score through penalty corner by executing push scope technique. Hence, power is playing a major role for the Hockey players to achieve high level of performance.

In any physical activity or in any game situation, the controlled ability to stop, to start and to change direction rapidly and more quickly is a very essential factor and this quality decides one's performance level and the speed of acquiring any skill.
Agility plays a significant role in the training of technique and tactics in competition. The aim of training skills is to bring the athlete closer and closer to the ideal form of the sequence of movement.

Changing position and direction of the body quickly at a higher speed is very much useful in speedy games like Hockey, Basketball, soccer, and events like High Jump and Pole vault. Players having more agility perform better than others in games and sports.

A hockey player must have good agility in all the three types of play fields with the ball and without the ball. Agility is more important for all the Hockey players playing in different positions like forward, half backs and fullbacks. After removing the obstruction rules in Hockey, agility with the ball and without the ball became more important for the attacker to control over the ball during the game to beat or to dodge the defender. When the forwards are having the ball it is very difficult for the defender to tackle because if the defender allows the forward to his right side and tackle the forward turn towards his left side and dodge the defender easily. If the defender allows left side and tackle with reverse stick, the forward player will turn right side and dodge the defender without any difficulty. It is not only for the defender to tackle the ball successfully but also for the forward to tackle the ball from the defender when they are in possession of the ball.

A defender also makes a semi circular movement either to left or to right and clearly makes a pass to the team mate without any difficulty (Martin H. Anderson et al., 1976).
In sports, endurance ensures optimum speed of motor actions. The ability to maintain pace or tempo of an exercise during a competition is impossible without the requisite level of endurance. Good endurance ensures high quality or skill of movement execution which finds expression in accuracy, precision, rhythm and consistency.

Endurance training results in the improvement of functioning of various organs and systems of human body. This in turn improves the ability to recover quickly from training and competition load. At the same time, endurance activities enable the sportsman to better resist the fatigue.

The simplifications of the rules not only attract the players and also the spectators. The game of Hockey is played seventy minutes with an interval of ten minutes. Playing in the artificial surface and in other surfaces continuously for seventy minutes is more difficult. The players who have good endurance only can play the game continuously without fatigue, and also can perform better. After the change of off-side rule and the introduction of the rolling substitution, the game has become more faster. The player has to run faster and play the game continuously for seventy minutes and it requires more endurance capacity to do better performance. Hence, cardio respiratory endurance is vital for all the Hockey players at all the levels (Hardayal Singh, 1991).
The game of Hockey largely depends upon skills, physical make up of the body, psychological built up and motor qualities of the player. The performance of Hockey is also based on the proficiency of skills such as dribbling, hitting, stopping, flicking, scooping, passing and goal shooting.

Dribbling is used to enable a player to cover ground with the ball in possession, as a preparation for other stroke for example, when maneuvering to pass or shoot, to move away from an attempted tackle, or to accelerate into a space and so draw a defender away from a crowded area. The art of dribbling is most important and a player is not perfect until he has mastered it. The chief object of dribble is to run as fast as possible with the ball under control, tapping it from right to left and then to the right continuously (H. C. Dubey, 1991).

Hitting can often be of decisive importance in the outcome of the match. It is one of the most useful technical acquisitions for any player, of equal importance for both defenders and forwards. The great advantage over the push and flick lies in its endless possibilities for moving the ball quickly to any part of the field. The hit is made up of several components but a clear distinction is difficult between them as the hit results from a connected series of movements (H. C. Dubey, 1991).

Pushing is mostly used for passing over short distances and it is the quickest and easiest of all the methods of passing to learn. The complete movement of push is relatively simple compared with the
other ways of passing i.e. the hit, the flick and the scoop. It takes far less time and is carried out without much preliminary action. Using the pushed pass, the player dribbling with the ball can play it at any moment in any direction even when dribbling at top speed (Horst Wein, 1973).

Every action of the attacking side is directed at getting in to the circle and producing a successful shot at the opponent’s goal. Generally speaking, the shot at goal should be made as soon as the forward has crossed the edge of the circle. For this reason all forwards must be able to shoot hard and quickly at top speed. During the course of the game, countless attacks are mounted. Only very few culminate with the favourable opportunity for a shot at goal. So the forwards must use the chances with special concentration, determination and prudence (Deepak Jain, 2000).

STATEMENT OF THE PROBLEM

The purpose of the study was to investigate the effects of varied circuit training packages of different frequencies on Bio-motor and Hockey skill performance variables of inter collegiate level male hockey players.
HYPOTHESES

Any systematic and scientific training will produce desirable effects if administered for a specific period. Therefore,

1. It was hypothesized that there would be significant improvement on all the selected dependent variables due to the circuit training package A for two days and three days per week, and circuit training package B for two days and three days per week.

2. It was hypothesized that there would be significant difference among circuit training package A for two days and three days per week, and circuit training package B for two days and three days per week on selected dependent variables.

3. It was hypothesized that the improvement in speed, power, agility and cardio respiratory endurance for circuit training package A for three days per week would be significantly higher than that of circuit training package A for two days per week, circuit training package B for two days per week and circuit training package B for three days per week on selected dependent variables.

4. It was hypothesized that the improvement in dribbling, hitting, pushing and goal shooting for circuit training package B for three days per week would be significantly higher than that of circuit training package A for two days per week, circuit training package B for three days per week and circuit training package B for two days per week on selected dependent variables.
DELIMITATIONS

1. For the purpose of this study, only forty male students who represented their college teams in the intercollegiate level Hockey tournaments were selected at random from K.Ramasamy Arts college and National Engineering college Kovilpatti, Tamilnadu, India. The age of the subjects ranged from 18 to 25 years.

2. The subjects were assigned at random to one of the four groups (n=10), in which Group I and II had undergone circuit training package A (interval method) for 2 days per week and 3 days per week respectively. Group III and IV had undergone circuit training package B (continuous method) for 2 days per week and 3 days per week respectively.

3. The training packages were given to the subjects for a period of only 12 weeks.

4. The criterion variables tested were speed, power, agility, cardio-respiratory endurance (bio-motor variables), dribbling, hitting, pushing and goal shooting (Hockey skill performance variables) only.

5. The selected Bio-motor variables were assessed by using the standardized tests.

6. The Hockey skill performance variables were assessed by using the skill tests formulated by Stewart Pither.
LIMITATIONS

The following factors were considered as limitations in the study by the investigator.

1. Though the subjects were motivated verbally, no attempt was made to differentiate their motivation level during testing and training.

2. No special effort was put in to find out the differences in environmental conditions during pre and post-tests; however dry weather prevailed during the tests.

3. Since the subjects were from various colleges, their past experience in training was not taken into consideration.

4. The time taken for 50 metres run was measured by hand operation, and was rounded to one tenth of a second.

5. Psychological factors, food habits, rest period, life style etc. could not be controlled.

DEFINITIONS OF THE OPERATIONAL TERMS

Frequency

The optimal training frequency is defined as the "number of training sessions per week" (Steven J. Fleck, 1951).
Hockey

Hockey is a game which normally lasts 70 minutes, divided in to two halves of 35 minutes each with an interval of 5 to 10 minutes in between. Teams change ends at the interval. Hockey is played with a curved stick flat on one side (for hitting) and rounded on the other, and a small ball weighing 5 ½ to 5 ¾ ounz. The object of the game is to send the ball in to the opponents' net thus scoring a goal (Yogarajthani, 2002).

Circuit

Circuit is the term used to designate the total series of exercises, usually eight to twelve exercises (Mac Miller, 1974).

Circuit training

Circuit training is the programme in which an athlete moves from one exercise station to another in a planned sequence and in the shortest possible time (Neal, 1969).

Bio-motor variables

Bio-motor variables denote the physical fitness qualities like muscular strength, speed, explosive strength, muscular endurance, cardio-respiratory endurance etc.

Speed

The rate at which a body moves from one location to another is speed (Charles B. Corbin and Ruth Lindsey, 1985).
Power

The ability of the muscles to exert force quickly and to overcome resistance with a high speed of contraction (Hardayal Singh, 1991).

Agility

It is the quality of a muscle to contract forcefully in the quickest possible time (Hardayal Singh, 1991).

Cardio Respiratory Endurance

Cardio respiratory endurance is the ability of the lungs and heart to take in and transport adequate amount of oxygen to working muscles which allows activities involving large muscle groups to be sustained for long period of time (Fox, 1993).

Dribbling

Dribbling is the basic skill in field Hockey. Of all the basic skills, the dribble is the one which can most often open up a game and create that all important goal scoring chance (Taylor Ian and David Vear, 1998).

Goal shooting

"Any stroke by an attacker from within the shooting circle towards the goal" is called as goal shooting (FIH - Rules of Hockey, 1997).
Pushing

A "Push" moves the ball along the ground by a pushing movement of the stick after the stick has been placed close to the ball. When a push is made, both the ball and the head of the stick are in contact with the ground (FIH - Rules of Hockey, 1977).

Hitting

A Hit is a stroke with a swinging movement of stick in order to increase the ball's speed (Taylor Ian and David Vear, 1998).

SIGNIFICANCE OF THE STUDY

1. The results of the present study would throw light on the existing controversies in using circuit - training.

2. The results of the study would also help the players and coaches in colleges in the development of bio-motor and skill performance of field Hockey.

3. The findings of the study would add to the quantum of knowledge in the area of training and training methods especially circuit training.

4. The findings of the study would be of greater value in designing coaching programme using varied packages of circuit training.