

**RESEARCH ARTICLE****EFFECT OF WARM-UP OF DIFFERENT DURATION ON SELECTED SOCCER SKILL PERFORMANCE****Dr. Biswajit Sardar**

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Introduction

A warm-up helps your body prepare itself for exercise and reduces the chance of injury. The warm-up should be a combination of rhythmic exercise which begins to raise the heart rate and raise muscle temperature, and static stretching through a full range of motion. The rhythmic exercise may be a slower version of the aerobic activity to come. For example, you might want to walk before you jog, or do some aerobic dance movements before an aerobic or step class. The stretches in the warm-up should be non-ballistic and cover all of the major muscle groups. Always stretch the lower back before doing any lateral movement of the upper torso such as side bends.

A warm up is intended to raise the body temperature and prepare a player physiologically and psychologically to compete in a competitive game. Research has suggested that the optimum duration of the warm up period, before flexibility or functional activities are undertaken, should be between 15 and 20 minutes. This should consist of a gradual increase in intensity until the player is working at 70% of maximal heart rate. A warm up at this intensity has the effect of allowing an increase in the range of movement of the joints and improving aerobic performance. This means the player becomes more flexible and running efficiency improves.

Warm-up exercises are essential to any workout. Preparing the muscles and joints for more intense activity helps prevent injury, as well as promoting circulation. Warm-up exercises increase the temperature of the body, making the muscles more flexible and receptive to strenuous activity. Most experts even advise that you engage in warm-up exercises before stretching. Warming up should slightly increase the heart rate but not to the level experienced during your workout

A warm-up period is the first part of every training session or preparation for competition. The warm-up starts slowly and systematically and gradually involves all muscles and body parts that prepare the athlete for training and competition. In addition to preparing the athlete mentally, warming up also has several physiological benefits. Football is an active and physically demanding game. The importance of a warm-up prior to exercise cannot be overemphasized. A warm-up raises the body temperature and prepares the muscles, nervous system, tendons, ligaments and the cardiovascular system for upcoming stretches and exercises. The chances of injury are greatly reduced by increasing muscle elasticity. A player must always be ready and capable to produce 100 percent

of effort from the kickoff. There are three types of warm-up. Passive warm-up involves increasing the temperature by external means, such as massages, heating pads, steam baths or hot showers. Athletes with physical limitations may benefit from passive warm-up. General warm-up increases overall body temperature through movement of major muscle groups that may or may not be associated with the upcoming activity; for example, jogging.

Players need to warm up not just before matches but also prior to their daily training sessions. The intensity of the exercises should increase gradually although it is important coaches do not to wear their players out by making them warm up for too long.

Warming up before a game or practice helps prepare you physically and mentally for exercise and competition. Before running hard, throwing deep passes and tackling opponents on the football field, you should be warmed up and loose to avoid injury and increase physical ability. It also allows for quicker muscle contraction and relaxation, increased force production, better reaction time, improved muscular power and strength, increased blood flow to muscles and enhanced metabolic reactions.

Football refers to a number of sports that involve, to varying degrees, kicking a ball with the foot to score a goal. The most popular of these sports worldwide is association football, more commonly known as just "football" or "soccer". Unqualified, the word football applies to whichever form of football is the most popular in the regional context in which the word appears, including association football, as well as American football, Australian rules football, Canadian football, Gaelic football, rugby league, rugby union, and other related games. These variations of football are known as football codes.

Advancing the ball with kicks, running with it, passing to other team mates, trying to forward it to the opponent's end of the field, shooting in between the goal posts and scoring a point, this is football. The winning team is the one that has scored more number of points (goals) when a specified length of time has elapsed.

Various forms of football can be identified in history, often as popular peasant games. Contemporary codes of football can be traced back to the codification of these games at English public schools in the eighteenth and nineteenth centuries. The influence and power of the British Empire allowed these rules of football to spread to areas of British influence outside of the directly controlled Empire, though by the end of the nineteenth century, distinct regional codes were already developing: Gaelic Football, for example, deliberately incorporated the rules of local traditional football games in order to maintain their heritage. In 1888, The Football League was founded in England, becoming the first of many professional football competitions. During the twentieth century, several of the various kinds of football grew to become among the most popular team sports in the world.

The game was re-invented, after over a thousand years by the English. But the name 'Football' was used by number of different related team sports, such as Rugby football, American football, Australian rules football, Gaelic football and Canadian football. Association football goes by the name 'Soccer.' However, many believe that Walter Camp adapted rugby into the sport of football.

All football players need to make sure they properly warm up before performing any high impact activities or speed and agility training. In the past, static stretching was considered the norm, but in recent years static stretching has become an addition to the everyday dynamic stretch routine. At Kbands Training we have put together a dynamic stretch routine that utilizes Kbands. After a small warm-up, football players can increase blood to their legs by running through a sequence of dynamic moves while wearing Kbands. An increase in blood flow throughout the lower half of the body can improve performance and decrease chances of injury. Refer to the video below to follow along as Trevor Theismann explains to football players what muscles to get loose, proper technique, and things to watch out for when completing each exercise.

Football players along with any other athlete should not be challenged by high impact fast-paced warm-up drills. Football coaches and trainers should slowly warm the body up with 1 to 2 plane movements. The best dynamic warm-up routine is completed going back and forth between an 8 to 10 yard stretch. This will allow the football players to get out and move to warm up their body slowly. As the warm-up continues use multi-joint movements to increase blood flow throughout the body. The best way to run a successful dynamic warm-up is to do it yourself. Make sure before adding Kbands resistance your body has a light sweat and is ready to go. At this point football coaches and trainers should have their athletes begin using Kbands. Work to challenge football player's depth, flexibility, and speed as you finish the dynamic warm-up. Football coaches and trainers may also end with 10 to 15 yard sprints in the bands for 6 to 8 reps and then 4 to 6 reps without the bands. When the bands are taken off football coaches and trainers will immediately see the difference in their athletes faces.

The warm up is vital before any game of football, or indeed any training session, in order to avoid injuring oneself. Football is a game that regularly places considerable strain on the joints and muscles and therefore it is extremely important to complete a thorough warm-up regime. Its worth is reflected in the series of drills devised by the best coaches over the years to get the team ready.

Before starting any sport your muscles are cold and subsequently prone to being overstretched in any drastic bodily movement. Such movements are repeated continuously in any game of football; an overstretched leg in a tackle, or a quick 360° turn to evade an opposition player.

The aim of a warm-up is to gradually warm the muscles, avoiding any drastic movement of the limbs. After that, the objective is to statically stretch the muscles in preparation for the type of movements that you will do during the game. Stretches may therefore be quite different for a forward compared with a defender or, indeed, a goalkeeper.

A warm-up must be initiated by a gentle jog, probably in an area of 15-20 yards, maintaining a normal, gentle stride pattern. Later on in the warm-up this stride pattern can be varied. Common to most football warm-ups are the following running exercises that begin to stretch and to prepare the joints for the changes in pace that are frequent in any game of football.

STATEMENT OF THE PROBLEM

The purpose of the study was to determine the Effect of Warm-up of Different Duration on Soccer Skill Performance.

DELIMITATION

1. The study was delimited to the male soccer players of Laxmaibai National Institute of Physical Education, Gwalior, in India, who were the member of soccer match Practice group.
2. The study confined only to the general warm-up procedure.
3. The study was further delimited to only two soccer skill test namely Dribbling for Time and Kicking for Distance.

LIMITATION

1. The daily routine life and voluntary participation of the other physical activities which were not under the control scholar that was considered as a limitation of the study.
2. Participation in other work out as a part of the daily life activity was considered as limitation of the study.

HYPOTHESIS

It was Hypothesized that there would be no Difference in the Effect of Warm-up exercise of different duration on soccer skill performance.

DEFINITION AND EXPLANATION OF TERMS

SOCCER

A form of football played between two teams of 11 players, in which the ball may be advanced by kicking or by bouncing it off any part of the body but the arms and hands, except in the case of the goalkeepers, who may use their hands to catch, carry, throw, or stop the ball.

A game in which two teams of eleven players try to kick or head a ball into their opponent's goal, only the goalkeeper on either side being allowed to touch the ball with his hands and arms except in the case of throw-ins.

Soccer is a sport played by teams of eleven people trying to get a ball into the other team's net by using any part of their body except arms or hands.

A game played with a round ball by two teams, usually of eleven players, on a field with a goal at either end: the ball is moved chiefly by kicking or by using any part of the body except the hands and arms.

WARM-UP

A period or act of preparation for a match, performance, or exercise session, which involves gentle exercise or practice.

The act or an instance of warming up; also: a preparatory activity or procedure.

Warm-up is the preparation carried out immediately before physical work with the intention of procedure optimum work performance.

DRIBBLING

Dribbling is the altering the speed and direction of the ball by sudden movement in various directions with the right or left foot.

A dribble is the act of running with the ball at feet while maintaining possession. It is often used to take the ball around an opposition player.

SIGNIFICANCE OF THE STUDY

The future of nation depends upon the future of its children. Proper upbringing of the children goes a long way in the development and well-being of the nation. Thus participation in physical education and sports programme is essential for realizing their true potential.

1. Some finding of the study may assist the physical education teacher and coaches to provide proper warming-up in terms of duration and intensity of work.
2. The method of warming-up suggested in the study may enable the football players to execute the skills more efficiency.
3. The study will be immense help to the teachers of physical education and coaches involving to determine the effectiveness of different duration of warming-up so that their sportsman are able to put up better performance.
4. The study may be useful to the scientists, physical educationist, coaches, trainer and those who want to use it as per their need and necessity in their respective areas.

Chapter - II

REVIWE OF RELATED LITERATURE

A review of research report related to the present study that the research scholar could gather, is presented in this chapter in order to provide the back ground material to evaluate the significance of the study as well as to interpret its finding.

Needham RA, et al (2009) was purpose of the study was to investigate the acute effect of different warm-up protocols on anaerobic performance in elite youth soccer players. Twenty elite youth soccer players (mean age 17.2 +/- 1.2 years) performed 3 different warm-up protocols in a random order on nonconsecutive days. Each warm-up protocol consisted of a 5-minute low-intensity jog followed by 10 minutes of static stretching (SS), dynamic stretching (DS), or dynamic stretching followed by 8 front squats + 20% body mass (DSR). Subjects performed a countermovement jump followed by a 10- and 20-m sprint test immediately and at 3 and 6 minutes after each warm-up protocol. Vertical jump performance following DSR was better at 3 and 6 minutes than after DS, which in turn was better than after SS at 0, 3, and 6 minutes ($p < 0.05$). Jump performance was better at 3 minutes than immediately after, and this improvement was maintained at 6 minutes after DSR ($p < 0.05$). A better sprint performance was observed after DSR and DS compared with SS immediately and at 3 and 6 minutes following each warm-up protocol ($p < 0.05$). The results of the study suggest that a dynamic warm-up with the inclusion of resistance enhances jumping ability more than dynamic exercise alone. In addition, a dynamic warm-up produces a superior sprint and jump performance compared to a warm-up consisting of static stretching.

Gelen E, (2010) Although study the pre-event static stretching is an accepted practice in most athletics program, pre-event dynamic exercise is becoming popular. The purpose of this study was to compare the acute effects of different warm-up methods on soccer performance. Twenty-six professional soccer players (23.3 +/- 3.2 years, 178.2 +/- 6.1 cm, and 73.0 +/- 6.5 kg) performed 4 different warm-up routines in random order on nonconsecutive days. The warm-up methods consisted of only 5 minutes of jogging (Method A), 5 minutes of jogging and static stretching (Method B), 5 minutes of jogging and dynamic exercise (Method C), and 5 minutes of jogging and a combination of static stretching and dynamic exercise (Method D). After each warm-up session, subjects were tested on the sprint, slalom dribbling, and penalty kick performance. Methods A-D was compared by repeated-measures analyses of variance and post hoc comparisons. In this study, existence of a significant drop in sprint, slalom dribbling, and penalty kick performances of Method C has been determined in comparison with that of

Method A ($p < 0.05$). Again for sprint, slalom dribbling, and penalty kick performances of Method A in comparison with those of Method A, the existence of a significant increase has been determined ($p < 0.05$). In Method D in comparison with Method A, for sprint, slalom dribbling, and penalty kick performances, existence of no significant difference has been determined ($p > 0.05$). The results of this study suggest that it may be desirable for soccer players to perform dynamic exercises before the performance of activities that require a high power output.

Katis A, et al (2010) was purpose of the present study was to compare the three-dimensional kinematics of the lower extremities and ground reaction forces between the instep kick and the kick with the outside area of the foot (outstep kick) in pubertal soccer players. Ten pubertal soccer players performed consecutive kicking trials in random order after a two-step angled approach with the instep and the outstep portion of the foot. Three-dimensional data and ground reaction forces were measured during kicking. Paired t-tests indicated significantly higher ($P < 0.05$) ball speeds and ball/foot speed ratios for the instep kick compared with the outstep kick. Non-significant differences in angular and linear sagittal plane kinematic parameters, temporal characteristics, and ground reaction forces between the instep and outstep soccer kicks were observed ($P > 0.05$). In contrast, analysis of variance indicated that the outstep kick displayed higher hip internal rotation and abduction, knee internal rotation, and ankle inversion than the instep kick ($P < 0.05$). Our results suggest that the instep kick is more powerful than the outstep kick and that different types of kick require different types of skill training.

Wong PL, et al (2011) examined the repeated-sprint ability (RSA) in soccer players after 3 days of static stretching. Twenty soccer players (age: 16.8 ± 0.4 years) participated in 2 series of experiments with within-subject repeated-measure design (control series [CON]: 13-minute aerobic warm-up; and static-stretching series [SS]: 10-minute aerobic warm-up and 3-minute static stretching). Each series consisted of 5 days, and RSA (9×30 m separated by 25-second passive recovery) was tested on days 1 and 5. Static stretching was performed for 3 consecutive days from days 2-4, before and after intermittent aerobic endurance exercise on each day. The same warm-up protocol was used before and after all RSA tests and exercises within 1 series. No significant difference between CON and SS was observed ($p > 0.05$) in RSA for overall (all sprints), early phase (first to third sprints), middle phase (fourth to sixth sprints), and final phase (seventh to ninth sprints). Short-term static stretching had trivial effects (Cohen's $d < 0.35$) on overall and split RSA phases (early, middle, and final). The present study showed that performing static stretching for 3 consecutive days and before repeated-sprint test did not negatively affect RSA. However, it is premature to recommend that static stretching could be included in in-season daily warm-up routine because some movements such as jump and single sprint were more sensitive to static stretching.

Zakas A, et al (2006) was to examine in field conditions the acute effects of passive stretching after a general warming-up bout as well as the effects of passive stretching alone. Eighteen adolescent team soccer players participated in this study performing 3 different flexibility-training protocols in separate training sessions. In the first treatment stretching protocol a general warm-up was performed where subjects jogged for 20 minutes. The second treatment stretching protocol consisted of the same general warm-up followed by passive stretching of the lower extremities and the trunk, whereas the third and final treatment stretching protocol consisted of passive stretching alone, without any jogging. Passive range of joint motion was examined in hip flexion, hip extension, hip abduction, ankle dorsiflexion, knee flexion and trunk flexion using a goniometer and a flexometer. The general warming-up session induced a significantly increased range of motion only at the ankle dorsiflexion joint ($P < 0.05$). Results also suggest that passive stretching alone and passive stretching after a general warming-up bout both induced a significantly increased range in all lower extremity joints and trunk flexion ($P < 0.001$). Improvements in flexibility are observed after passive muscle elongation, irrespective of warming-up.

Brophy RH, et al (2007) to examined quantify phase duration and lower extremity muscle activation and alignment during the most common types of soccer kick-the instep kick and side-foot kick. A second purpose was to test the hypotheses that different patterns of lower extremity muscle activation occur between the 2 types of kicks and between the kicking limb compared to the support limb. Soccer players are at risk for lower extremity injury, especially at the knee. Kicking the soccer ball is an essential, common, and distinctive part of a soccer player's activity that plays a role in soccer player injury. Regaining the ability to kick is also essential for soccer athletes to return to play after injury. Thirteen male soccer players underwent video motion analysis and electromyography (EMG) of 7 muscles in both the kicking and supporting lower extremity (iliacus, gluteus maximus, gluteus medius, vastus lateralis, vastus medialis, hamstrings, gastrocnemius) and 2 additional muscles in the kicking limb only (hip adductors, tibialis anterior). Five instep and 5 side-foot kicks were

recorded for each player. Analysis-of-variance models were used to compare EMG activity between type of kicks and between the kicking and nonkicking lower extremity. Five phases of kicking were identified: (1) preparation, (2) backswing, (3) limb cocking, (4) acceleration, and (5) follow-through. Comparing the kicking limb between the 2 types of kick, significant interaction effects were identified for the hamstrings ($P = .02$) and the tibialis anterior ($P < .01$). Greater activation of the kicking limb iliopsoas ($P < .01$), gastrocnemius ($P < .01$), vastus medialis ($P = .016$), and hip adductors ($P < .01$) occurred during the instep kick. Significant differences were seen between the kicking limb and the support limb for all muscles during both types of kick. Certain lower extremity muscle groups face different demands during the soccer instep kick compared to the soccer side-foot kick. Similarly, the support limb muscles face different demands than the kicking limb during both kicks. Better definition of lower extremity function during kicking provides a basis for improved insight into soccer player performance, injury prevention, and rehabilitation.

Lees A, et al (2010) was study the Kicking is the defining action of soccer, so it is appropriate to review the scientific work that provides a basis of our understanding of this skill. The focus of this review is biomechanical in nature and builds on and extends previous reviews and overviews. While much is known about the biomechanics of the kicking leg, there are several other aspects of the kick that have been the subject of recent exploration. Researchers have widened their interest to consider the kick beginning from the way a player approaches the ball to the end of ball flight, the point that determines the success of the kick. This interest has encapsulated characteristics of overall technique and the influences of the upper body, support leg and pelvis on the kicking action, foot-ball impact and the influences of footwear and soccer balls, ball launch characteristics and corresponding flight of the ball. This review evaluates these and attempts to provide direction for future research.

Young WB, et al (2011) examined all codes of football, it is advantageous to be able to achieve a high ball speed or distance in a kick. An important determinant of ball speed and kick distance is the velocity of the foot at impact with the ball. Therefore, it is of interest to strength and conditioning practitioners to identify training programs that can increase foot velocity. The purpose of this review is to identify the factors influencing kicking performance and the research evidence relating to resistance training designed to enhance foot velocity in kicking. The review has been divided into 3 main sections. The first addresses the biomechanics of kicking to provide insights into the physical demands. The second section reviews the relationships between various measures of strength with performance indicators of maximum kicking, and the third part explores the research investigating the effects of resistance training on maximum kicking performance. Kicking can be described as a skill involving proximal-to-distal muscle activation. Foot velocity is determined by a complex sequencing of hip flexor and knee extensor concentric contractions and also involves hip extensor and knee flexor activation to assist with movement control. Research reporting correlations between strength and kicking performance support the importance of hip flexor and quadriceps strength. Although unclear, there is some evidence that adequate strength of the support leg, trunk muscles, hip adductors, and the muscles that control pelvic rotations are important. Strength training studies have shown that foot velocity and kicking performance can be enhanced by supplementary programs to regular football training, especially in nonelite athletes. Potentially valuable training includes plyometrics, exercises that simulate the whole kicking action, and kicking weighted balls. Exercises that isolate parts of the kicking action are not recommended because these do not appear to transfer well to kicking performance. There are many unanswered questions that await future research.

Ball K, (2008) was study the Kicking for distance in Australian Rules football is an important skill. Here, I examine technical aspects that contribute to achieving maximal kick distance. Twenty-eight elite players kicked for distance while being videoed at 500 Hz. Two-dimensional digitized data of nine body landmarks and the football were used to calculate kinematic parameters from kicking foot toe-off to the instant before ball contact. Longer kick distances were associated with greater foot speeds and shank angular velocities at ball contact, larger last step lengths, and greater distances from the ground when ball contact occurred. Foot speed, shank angular velocity, and ball position relative to the support foot at ball contact were included in the best regression predicting distance. A continuum of technique was evident among the kickers. At one end, kickers displayed relatively larger knee angular velocities and smaller thigh angular velocities at ball contact. At the other end, kickers produced relatively larger thigh angular velocities and smaller knee angular velocities at ball contact. To increase kicking distance, increasing foot speed and shank angular velocity at ball contact, increasing the last step length, and optimizing ball position relative to the ground and support foot are recommended.

Kellis E, et al (2007) examined the Good kicking technique is an important aspect of a soccer player. Therefore, understanding the biomechanics of soccer kicking is particularly important for guiding and monitoring the training process. The purpose of this review was to examine latest research findings on biomechanics of soccer kick performance and identify weaknesses of present research which deserve further attention in the future. Being a multiarticular movement, soccer kick is characterised by a proximal-to-distal motion of the lower limb segments of the kicking leg. Angular velocity is maximized first by the thigh, then by the shank and finally by the foot. This is accomplished by segmental and joint movements in multiple planes. During backswing, the thigh decelerates mainly due to a motion-dependent moment from the shank and, to a lesser extent, by activation of hip muscles. In turn, forward acceleration of the shank is accomplished through knee extensor moment as well as a motion-dependent moment from the thigh. The final speed, path and spin of the ball largely depend on the quality of foot-ball contact. Powerful kicks are achieved through a high foot velocity and coefficient of restitution. Preliminary data indicate that accurate kicks are achieved through slower kicking motion and ball speed values. Key points Soccer kick is achieved through segmental and joint rotations in multiple planes and via the proximal-to-distal sequence of segmental angular velocities until ball impact. The quality of ball - foot impact and the mechanical behavior of the foot are also important determinants of the final speed, path and spin of the ball. Ball speed values during the maximum instep kick range from 18 to 35 msec(-1) depending on various factors, such as skill level, age, approach angle and limb dominance. The main bulk of biomechanics research examined the biomechanics of powerful kicks, mostly under laboratory conditions. A powerful kick is characterized by the achievement of maximal ball speed. However, maximal ball speed does not guarantee a successful kick: in each case, the ball must reach the target. As already explained, when the player is instructed to hit the ball accurately, joint and segment velocities are lower as opposed to a fast and powerful kick performance. It is therefore apparent that future research should focus on biomechanics of fast but accurate kicking.

Juarez D, et al (2011) aim of this study was to describe the kinematic pattern of the kicking movement of young top-class soccer players focusing in examining the linear joint markers velocity of the leg kick and the segments angular position. Maximal in step kicks performed by 21 young top-class soccer players (16.1 ± 0.2 years) were analyzed using a three dimensional motion capture system. The ball was released at a mean velocity of 30.6 ± 1.54 m/s. The maximum linear velocity of the hip (5.49 ± 0.53 m/s), knee (10.89 ± 0.63 m/s), ankle (19.36 ± 0.96 m/s) and toe (24.59 ± 1.33 m/s) joint markers were achieved consecutively during the kick, representing a typical proximal to distal kinetic chain. Significant ($P < 0.01$) differences in the arms, trunk, thigh, shank and foot segments angular positions were found among the instant times in which the key events took place, determined by the maximum velocity of the hip (T1), knee (T2), ankle (T3) and toe (T4) joint markers (except between T3 and T4). This fact indicates that the instant time when each joint marker reached its maximum velocity implied different positions of the body segments. The results of this study provide additional data about the kicking biomechanics of young top-class soccer players. This information should be taken in consideration by coaches that train young soccer players.

Markovic G, et al (2006) was despite the important role of kicking in various athletic activities, the reliability of tests of maximum kicking performance has not been evaluated. The aim of the present study was to assess the reproducibility of performance of standing kick, instep kick and drop kick. Male physical education students ($n=77$) were tested on maximum kicking performance by means of a standard Doppler radar gun. The maximal ball speed in the standing kick, instep kick and drop kick (averaged across the subjects and trials) were 19.8 ± 1.9 m s(-1), 26.7 ± 2.7 m s(-1) and 25.3 ± 2.2 m s(-1), respectively. There were no significant differences in the tested performances among the consecutive kicking trials of each test. The intraclass correlation coefficients ranged between 0.94 and 0.96 (95% confidence intervals 0.93-0.97). The limits of agreement for maximum ball speed in all three tests ranged from 0.2 ± 1.4 m(-1) to 0.3 ± 1.3 m s(-1), suggesting that in 95% of repeated trials the ball speed might be from 1.2 m s(-1) less to 1.6 m s(-1) greater than the original estimate. The coefficients of variation for all kicking tests were between 2.6% and 3.3% (95% confidence intervals; 2.2-3.9%) suggesting a low intra-subject variability. Due to a high reliability, relative simplicity, and a small number of participants needed to detect worthwhile changes, the evaluated kicking tests could be highly recommended for sport specific profiling and early selection of young athletes, as well as for the assessment of training procedures and other interventions applied on individual teams of elite soccer, rugby or American football players.

Young W, et al (2010) study of kicking accuracy (KA) is an important skill in Australian football but the potential influence of exercise on this skill has not been previously investigated. The purpose of this study was to

determine if a 2x2min time trial running protocol influenced short KA in elite Australian football. Another aim was to identify if endurance, playing experience and position were related to any exercise-induced KA changes. Twenty-seven professional footballers performed a KA test by kicking at a bullseye on a target projected onto a screen. The mean error from the centre of the target was the KA score. The players were assessed on the KA test, and then performed a 2x2min time trial with a 3-min recovery between runs. The total distance covered was used as a measure of endurance fitness, and the test also served as an exercise bout designed to impose some physiological stress. Immediately following this test, the players walked into the laboratory and performed the KA test again. A paired t-test revealed that the whole group achieved a non-significant 2.7% improvement in KA. Players were divided into two distinct groups based on endurance (2x2min results), playing experience and position (midfielders and forwards/backs). Analysis of covariance showed that after the exercise bout, the fitter group had significantly better KA ($p=0.010$) than the less fit group, and the more experienced players were 16% more accurate than the less experienced group ($p=0.055$). The midfielders were 8.2% better than the forwards/backs in KA ($p=0.32$). It was suggested that greater endurance and playing experience may facilitate KA under moderate physiological stress.

Ali A, (2011) The ability to execute skilled movement patterns efficiently and effectively is the most important aspect of soccer performance and players must apply cognitive, perceptual and motor skills to rapidly changing situations. There have been attempts to measure these parameters for talent identification (or development) purposes and skill acquisition and intervention research; the aim of this review is to examine the strengths and limitations of these tests. High levels of perceptual and cognitive skill are characteristics of those players who are able to look in the right places for information and process this information efficiently before deciding on a suitable course of action. The motor skills required to successfully control, pass, dribble and shoot the ball at goal are fundamental skills of the soccer player and a variety of methods have been used to measure these aspects. The tests mentioned in this review vary in their complexity and the type of skill(s) they purport to measure. The assessment of choice must come down to a number of factors including cost, available time and space, number of athletes in the cohort and experience of researchers. Furthermore, consideration must be given to the aim(s) of the research/assessment and issues relating to validity and reliability.

Mirkov D, et al (2008) was study the soccer-specific field tests are popular among coaches due to their simplicity, validity, and minimal use of equipment. Nevertheless, there is a general lack of data about their reliability, particularly regarding the tests of anaerobic performance. Twenty professional male soccer players performed 3 consecutive trials of the tests of throwing-in and standing-kick performance (the distance measured) as well as on timed 10-m sprint, flying 20-m sprint, running 10 x 5 m, zigzag running with and without the ball, and the skill index (i.e., the ratio of the zigzag running without and with the ball). With the exception of the throwing-in and standing kick, the evaluated tests revealed high intraclass correlation coefficients (i.e., >0.80), small within-individual variations (coefficient of variation, $<4\%$), and sample sizes for detecting a 2% change in the tested performance that are either close to or below the standard size of a professional soccer squad. In addition to simplicity and face validity, most of the evaluated tests revealed high reliability. Therefore, the evaluated tests are recommended for sport-specific profiling and early selection of young athletes as well as for routine testing procedures that could detect effects of various intervention procedures. Regarding the throwing-in and standing-kick tests, direct measurement of the ball velocity (e.g., with a standard radar gun) is recommended.

Halbertsma JP , et al (1996) to evaluate the effects of one 10-minute stretch on muscle stiffness in subjects with short hamstrings. Randomized control trial. Laboratory for human movement sciences in the department of rehabilitation of university hospital. Sixteen students from the Department of Human Movement Sciences participated with informed consent in the experiment. Subjects were limited to men and women without a history of neurological and orthopedic disorders. To select subjects with short hamstrings, the finger-ground distance had to be greater than 0cm (unable to touch the floor when bending forward) and the manual leg lifting was not to exceed 80 degrees. One group of 10 subjects performed static stretching exercises during 10 minutes interspersed with relaxing, whereas the untreated group of 6 subjects was used as a control. The instrumental straight-leg-raising set-up enables the measurement of the force needed to lift the leg, range of motion (ROM), pelvic-femoral angle, and the electromyogram of the hamstrings. These variables provide information about the stiffness, elongation, and state of activity of the hamstring muscles. One 10-minute sport stretch resulted in a significant increase in passive muscle moment, ROM, and elongation of the hamstrings. There was no significant change in the course of the passive muscle stiffness curve with respect to the prestretch stiffness curve. One session

of static stretching does not influence the course of the passive muscle stiffness curve. The increased ROM, i.e., the extensibility of the hamstrings, results from an increase in the stretch tolerance.

Halbertsma JP , et al (1994) Passive muscle stretch tests are common practice in physical therapy and rehabilitation medicine. However, the effects of stretching exercises are not well known. With an instrumental straight-leg-raising set-up the extensibility, stiffness, and electromyographic activity of the hamstring muscles have been experimentally determined and the effects of stretching exercises have been evaluated. Fourteen volunteers, aged 20 to 38 years (mean 27.3) were selected from a young healthy population with the toe-touch test (finger-ground distance greater than 0cm), and a straight-leg-raising angle about 80 degrees. According to usual standards the diagnosis was short hamstrings. One group of seven subjects was treated during 4 weeks with a daily home exercise program aimed at stretching the hamstrings, whereas the untreated group was used as a control. Instrumental straight-leg-raising was performed in the subjects of both groups. The significance of the differences between the mean values was determined with the Student's t-test. Comparison of the data obtained before and after the muscle stretching program showed a slight but significant increase in the extensibility of the hamstrings accompanied with a significant increase of the stretching moment tolerated by the passive hamstring muscles. However, the elasticity remained the same. It is concluded that stretching exercises do not make short hamstrings any longer or less stiff, but only influence the stretch tolerance.

Depino GM , et al (2000) Increased muscle flexibility from static stretching is supported by the literature, but limited research has assessed the duration of maintained flexibility gains in knee joint range of motion after same-day static hamstring stretching. The purpose of our study was to determine the duration of hamstring flexibility gains, as measured by an active knee-extension test, after cessation of an acute static stretching protocol. All subjects performed 6 active warm-up knee extensions, with the last repetition serving as the baseline comparison measurement. After warm-up, the experimental group performed 4 30-second static stretches separated by 15-second rests. Thirty male subjects (age = 19.8 +/- 5.1 years, ht = 179.4 +/- 18.7 cm, wt = 78.5 +/- 26.9 kg) with limited hamstring flexibility of the right lower extremity were randomly assigned to control and experimental groups. Postexercise active knee-extension measurements for both groups were recorded at 1, 3, 6, 9, 15, and 30 minutes. Tukey post hoc analysis indicated significant improvement of knee-extension range of motion in the experimental group that lasted 3 minutes after cessation of the static stretching protocol. Subsequent measurements after 3 minutes were not statistically different from baseline. A dependent t test revealed a significant increase in knee-extension range of motion when comparing the first to the sixth active warm-up repetition. Our results suggest that 4 consecutive 30-second static stretches enhanced hamstring flexibility (as determined by increased knee-extension range of motion), but this effect lasted only 3 minutes after cessation of the stretching protocol. Future research should examine the effect of other stretching techniques in maintaining same-day flexibility gains.

Bandy WD , et al (1994) To date, there are no reports comparing duration of static stretch in humans on joint range of motion (ROM) and hamstring muscle flexibility. The purpose of this study was to examine the length of time the hamstring muscles should be placed in a sustained stretched position to maximally increase ROM. Fifty-seven subjects (40 men, 17 women), ranging in age from 21 to 37 years and with limited hamstring muscle flexibility (ie, 30 degrees loss of knee extension measured with femur held at 90 degrees of hip flexion), were randomly assigned to one of four groups. Three groups stretched 5 days per week for 15, 30, and 60 seconds, respectively. The fourth group, which served as a control group, did not stretch. Before and after 6 weeks of stretching, flexibility of the hamstring muscles was determined by measuring knee extension ROM with the femur maintained in 90 degrees of hip flexion. Data were analyzed with a 4 x 2 analysis of variance (group x test) for repeated measures on one variable. The data analysis revealed a significant group x test interaction, indicating that the change in flexibility was dependent on the duration of stretching. Further post hoc analysis revealed that 30 and 60 seconds of stretching were more effective at increasing flexibility of the hamstring muscles (as determined by increased ROM of knee extension) than stretching for 15 seconds or no stretching. In addition, no significant difference existed between stretching for 30 seconds and for 1 minute, indicating that 30 seconds of stretching the hamstring muscles was as effective as the longer duration of 1 minute. The results of this study suggest that a duration of 30 seconds is an effective time of stretching for enhancing the flexibility of the hamstring muscles. Given the information that no increase in flexibility of the hamstring muscles occurred by increasing the duration of stretching from 30 to 60 seconds, the use of the longer duration of stretching for an acute effect must be questioned.

Bandy WD , et al (1997) Frequency and duration of static stretching have not been extensively examined. Additionally, the effect of multiple stretches per day has not been evaluated. The purpose of this study was to determine the optimal time and frequency of static stretching to increase flexibility of the hamstring muscles, as measured by knee extension range of motion (ROM). Ninety-three subjects (61 men, 32 women) ranging in age from 21 to 39 years and who had limited hamstring muscle flexibility were randomly assigned to one of five groups. The four stretching groups stretched 5 days per week for 6 weeks. The fifth group, which served as a control, did not stretch. Data were analyzed with a 5 x 2 (group x test) two-way analysis of variance for repeated measures on one variable (test). The change in flexibility appeared to be dependent on the duration and frequency of stretching. Further statistical analysis of the data indicated that the groups that stretched had more ROM than did the control group, but no differences were found among the stretching groups. The results of this study suggest that a 30-second duration is an effective amount of time to sustain a hamstring muscle stretch in order to increase ROM. No increase in flexibility occurred when the duration of stretching was increased from 30 to 60 seconds or when the frequency of stretching was increased from one to three times per day.

Roberts JM et al (1999) to investigate the effect of different durations of stretching (five or 15 seconds) on active and passive range of motion (ROM) in the lower extremity during a five week flexibility training programme. Twenty four university sport club members (19 men, five women), with a mean (SD) age of 20.5 (1.35) years, were randomly assigned to one of three groups (two treatment and one control). The two treatment groups participated in a static active stretching programme three times a week for a five week period, holding each stretch for a duration of either five or 15 seconds. The total amount of time spent in a stretched position was controlled. The five second group performed each stretch nine times and the 15 second group three times resulting in a total stretching time of 45 seconds for both groups for each exercise. The control group did not stretch. Active and passive ROM were determined during left hip flexion, left knee flexion, and left knee extension before and after the training programme using an inclinometer. Two factor within subject analysis of variance indicated no significant difference in ROM before and after the training programme for the control group. However, significant improvements in active and passive ROM ($p < 0.05$) were shown in both treatment groups after the five week training programme. Two factor analysis of variance with repeated measures and post hoc analysis showed significant differences between the treatment groups and the control group for the improvements observed in active ($p < 0.05$) and passive ($p < 0.05$) ROM. The five and 15 second treatment groups did not differ from one another when ROM was assessed passively, but significant differences were apparent for active ROM, with the 15 second group showing significantly greater improvements ($p < 0.05$) than the five second group. These findings suggest that holding stretches for 15 seconds, as opposed to five seconds, may result in greater improvements in active ROM. However, sustaining a stretch may not significantly affect the improvements gained in passive ROM.

Godges Jj, et al (1993) was purposes of this study were (1) to examine the effects of a passive hip extension stretching exercise program on hip extension range of motion (ROM), (2) to examine the effects of a trunk flexor exercise program on trunk flexor muscle performance, and (3) to examine the effects of passive hip extension stretching or trunk flexor exercises on walking and running economy. ("Gait economy" is defined as the steady-state oxygen consumption per unit of body weight required to walk or run at a specified velocity.) Twenty-five healthy, athletic, male college students (mean age = 21 years, mean weight = 75 kg, mean height = 172 cm) were randomly assigned to one of three groups: a control group ($n = 7$), a hip extension stretching group ($n = 9$), or a trunk flexor exercise group ($n = 9$). Before and after 3 weeks of intervention, the following measurements were obtained: right and left hip extension ROM, trunk flexor muscle performance, and walking and running economy. A three x two-way (groups x test sessions) analysis of variance (ANOVA) for repeated measures for unequal subject numbers was performed on each of the five dependent measures, with analysis of simple main effects applied when significant interactions were found. The ANOVA on right and left hip extension ROM revealed a significant interaction. Analyses of simple main effects showed that 3 weeks (six sessions) of passive hip extension stretching significantly improved right hip extension ROM (pretest = -20.4 degrees, posttest = -8.3 degrees) and left hip extension ROM (pretest = -16.8 degrees, posttest = -7.0 degrees). There also was a significant interaction for trunk flexor muscle performance. The analysis of simple main effects revealed that 3 weeks of daily trunk flexor exercises significantly improved trunk flexor muscle performance (pretest = 41.5 degrees, posttest = 60.4 degrees). The 3-week intervention program of hip extension stretching or trunk flexion exercises, however, did not produce significant changes in walking or running economy. The results suggest that (1) six treatment sessions of passive stretching were sufficient to improve hip extension ROM; (2) 3 weeks of exercises performed daily improved trunk flexor muscle performance; and (3) training of isolated tasks, such as hip flexibility or trunk strengthening activities, did

not produce the desired outcome in the economy of walking or running. Possible reasons for the results are discussed.

Anderson DI, et al (1994) The purpose of this study was to examine the changes in coordination associated with practice of a soccer kick. Video records were collected on 6 novices, right-footed soccer players prior to and after 20 regularly scheduled kicking practice sessions. Three experienced players were also videotaped for comparison. Movement of the right leg was digitized and analyzed using motion analysis software. As a result of practice, subjects were able to significantly increase the maximum resultant linear velocity of the foot, and these increases were accompanied by changes in the pattern of coordination underlying the movement. These changes were assessed qualitatively through the topological characteristics of the relative motions of the hip and knee and quantitatively through three different timing variables. The results provide some support for Bernstein's (1967) ideas on the acquisition of skilled behavior as well as for the two-stage model of motor learning proposed by Newell (1985).

Saliba L , et al (2001) was the relationships between lower limb strength and two Australian football (AF) skills were assessed for 19 sub-elite AF players. Knee extension (KE) and knee flexion (KF) strength were assessed using a Biodex isokinetic dynamometer at angular velocities of 60, 240 and 360 degrees/sec. The two AF skills evaluated were running vertical jump (VJ) and kicking performance (KP). VJ performance was defined as the maximal jump height measured with a Yardstick device. KP was gauged through video analysis, as the post-contact resultant ball velocity (BV) during maximal effort drop punt kicking. Strength was measured as the isokinetic peak torque (PT value). No significant correlations were detected between the isokinetic knee strength values and maximal kicking velocity. Low to moderate significant correlations ($r = 0.55 - 0.69$, $p < 0.05$) were detected between the isokinetic measures and VJ height. It may be inferred that additional strengthening of the knee musculature may enhance running VJ performance, but not necessarily kicking velocity for this group of sub-elite AF players.

Lees A et al (1998) this review was considers the biomechanical factors that are relevant to success in the game of soccer. Three broad areas are covered: (1) the technical performance of soccer skills; (2) the equipment used in playing the game; and (3) the causative mechanisms of specific soccer injuries. Kicking is the most widely studied soccer skill. Although there are many types of kick, the variant most widely reported in the literature is the maximum velocity instep kick of a stationary ball. In contrast, several other skills, such as throwing-in and goalkeeping, have received little attention; some, for example passing and trapping the ball, tackling, falling behaviour, jumping, running, sprinting, starting, stopping and changing direction, have not been the subject of any detailed biomechanical investigation. The items of equipment reviewed are boots, the ball, artificial and natural turf surfaces and shin guards. Little of the research conducted by equipment manufacturers is in the public domain; this part of the review therefore concentrates on the mechanical responses of equipment, player-equipment interaction, and the effects of equipment on player performance and protection. Although the equipment has mechanical characteristics that can be reasonably well quantified, the player-equipment interaction is more difficult to establish; this makes its efficacy for performance or protection difficult to predict. Some soccer injuries may be attributable to the equipment used. The soccer boot has a poor protective capability, but careful design can have a minor influence on reducing the severity of ankle inversion injuries. Performance requirements limit the scope for reducing these injuries; alternative methods for providing ankle stability are necessary. Artificial surfaces result in injury profiles different from those on natural turf pitches. There is a tendency for fewer serious injuries, but more minor injuries, on artificial turf than on natural turf pitches. Players adapt to surface types over a period of several games. Therefore, changing from one surface to another is a major aetiological factor in surface-related injuries. Heading the ball could lead to long-term brain damage. Simulation studies suggest the importance of ball mass, ball speed and player mass in affecting the severity of impact. Careful instruction and skill development, together with the correct equipment, is necessary for young players. Most applications of biomechanical techniques to soccer have been descriptive experimental studies. Biomechanical modelling techniques have helped in the understanding of the underlying mechanisms of performance, although their use has been limited. It is concluded that there are still many features of the game of soccer that are amenable to biomechanical treatment, and many opportunities for biomechanists to make a contribution to the science of soccer.

Dorge HC , et all (2002)The aims of this study were to examine the release speed of the ball in maximal instep kicking with the preferred and the non-preferred leg and to relate ball speed to biomechanical differences observed during the kicking action. Seven skilled soccer players performed maximal speed place kicks with the preferred and the non-preferred leg; their movements were filmed at 400 Hz. The inter-segmental kinematics and kinetics were derived. A coefficient of restitution between the foot and the ball was calculated and rate of force development in the hip flexors and the knee extensors was measured using a Kin-Com dynamometer. Higher ball speeds were achieved with the preferred leg as a result of the higher foot speed and coefficient of restitution at the time of impact compared with the non-preferred leg. These higher foot speeds were caused by a greater amount of work on the shank originating from the angular velocity of the thigh. No differences were found in muscle moments or rate of force development. We conclude that the difference in maximal ball speed between the preferred and the non-preferred leg is caused by a better inter-segmental motion pattern and a transfer of velocity from the foot to the ball when kicking with the preferred leg.

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Dorge HC et all (1999) The purpose of the study was to develop a method to record intramuscular electromyogram (EMG) from the iliopsoas muscle and to relate this activity to the kinetics during the soccer place kick. Seven skilled soccer players performed 3 maximal velocity place kicks. The kicks were filmed with a high-speed camera (400 Hz) and EMG recordings were obtained from 5 muscles of the kicking leg, including wire electrodes inserted into the m. iliopsoas. The EMG signals were compared to the kinetics of the kicking leg, which were calculated from the digitised film. The results showed hardly any torque reversal about the hip joint before impact. Angular deceleration of the thigh segment did not increase the angular velocity of the shank (work -3.57 to 0.0%). M. iliopsoas was active during the entire kicking motion (average EMG 65.1-100.9%), even in the period when the thigh was decelerating. Wire electrodes can successfully be applied to EMG recordings of fast unloaded movements.

Mognoni P et all (1994) was the purpose of this study is to assess if there is any correlation between isokinetic testing and field performance of young soccer players. The isokinetic peak torques of the knee extensor muscles in sitting position (TKE), and those of the hip flexor muscles in standing position (THF) were measured in 24 junior soccer players. Four angular velocities ($\omega = 1.05, 3.14, 4.19, 5.23 \text{ rad.s}^{-1}$ or 60, 180, 240, 300 deg.s⁻¹) were used for the knee extensors and three (1.05, 3.14, 4.19 rad.s⁻¹) for the hip flexors. On the field the subjects were asked to kick a stationary soccer ball as fast as possible against a barrier and the mean linear velocity over a 10 m path (v) was measured. TKE of the non dominant limb were higher than those of the opposite one at the three highest ω ($p < 0.05$). On the contrary the THF of the dominant limbs were higher than those of the controlateral, at the two highest ω . When the ball was kicked by the dominant or non dominant limbs, the mean values and standard deviations (\pm SD) of v were 23.6 (\pm 2.5) and 21.4 (\pm 2.6) m.s⁻¹. Torques and v were always positively correlated to each other; however, only in few cases was this relationship statistically significant. In conclusion the isokinetic torques do not seem to be good predictors of v , one of the several factors which determine the global performances of the soccer players.

Anderson DI et all (1994) was the purpose of this study was to examine the changes in coordination associated with practice of a soccer kick. Video records were collected on 6 novice, right-footed soccer players prior to and after 20 regularly scheduled kicking practice sessions. Three experienced players were also videotaped for comparison. Movement of the right leg was digitized and analyzed using motion analysis software. As a result of

practice, subjects were able to significantly increase the maximum resultant linear velocity of the foot, and these increases were accompanied by changes in the pattern of coordination underlying the movement. These changes were assessed qualitatively through the topological characteristics of the relative motions of the hip and knee and quantitatively through three different timing variables. The results provide some support for Bernstein's (1967) ideas on the acquisition of skilled behavior as well as for the two-stage model of motor learning proposed by Newell (1985).

Helgerud J , et all (2001) The aim of the present study was to study the effects of aerobic training on performance during soccer match and soccer specific tests. Nineteen male elite junior soccer players, age 18.1 +/- 0.8 yr, randomly assigned to the training group (N = 9) and the control group (N = 10) participated in the study. The specific aerobic training consisted of interval training, four times 4 min at 90-95% of maximal heart rate, with a 3-min jog in between, twice per week for 8 wk. Players were monitored by video during two matches, one before and one after training. In the training group: a) maximal oxygen uptake (VO₂max) increased from 58.1 +/- 4.5 mL x kg(-1) x min(-1) to 64.3 +/- 3.9 mL x kg(-1) x min(-1) (P < 0.01); b) lactate threshold improved from 47.8 +/- 5.3 mL x kg(-1) x min(-1) to 55.4 +/- 4.1 mL x kg(-1) x min(-1) (P < 0.01); c) running economy was also improved by 6.7% (P < 0.05); d) distance covered during a match increased by 20% in the training group (P < 0.01); e) number of sprints increased by 100% (P < 0.01); f) number of involvements with the ball increased by 24% (P < 0.05); g) the average work intensity during a soccer match, measured as percent of maximal heart rate, was enhanced from 82.7 +/- 3.4% to 85.6 +/- 3.1% (P < 0.05); and h) no changes were found in maximal vertical jumping height, strength, speed, kicking velocity, kicking precision, or quality of passes after the training period. The control group showed no changes in any of the tested parameters. Enhanced aerobic endurance in soccer players improved soccer performance by increasing the distance covered, enhancing work intensity, and increasing the number of sprints and involvements with the ball during a match.

Finnoff JT,et all (2002)Kicking accuracy is an important component of soccer performance. We constructed a plywood target measuring 243.5cm wide x 122cm high. Carbon paper applied to the surface of the target allowed measurement by 2 raters from a bull's-eye to 10 ball marks left by kicks. Intraclass correlation coefficients with 95% confidence intervals were used to determine the intra- and interrater reliability of the measurement to each ball mark. Mean and median distances from bulls-eye to ball mark were 89.9cm and 97.9cm, respectively (range, 25.7 to 150.75cm). The intraclass correlation coefficients for intra- and interrater reliability were 0.99. The root mean square error of measurement indicated that accuracy of measurement was within 0.15cm. These results suggest that our method of assessing kicking accuracy is a valid and reliable tool for analysing performance. Because this tool closely replicates kicking into a soccer goal, we feel that it also has validity. To our knowledge, no other tool or measure (e.g.. number of shots on goal or number of goals per game) has comparable validity and reliability. This method can be used as a training tool and for future investigations of kicking accuracy.

Raastad T, et all (1997) In a randomized, placebo-controlled study the effect of 10 weeks of supplementation with either 5.2 g of a concentrated fish oil triglyceride (Triomar) enriched in omega-3 fatty acids (1.60 g/day EPA and 1.04 g/ day DHA) or 5.2 g corn oil (serving as placebo) on maximal aerobic power, anaerobic threshold and running performance was assessed in 28 well-trained male soccer players (18-35 years). Supplements were given as 650-mg capsules. Capsule assignment was randomized to one omega-3 group (n = 15), given eight Triomar capsules per day, and one placebo group (n = 13), given eight capsules of corn oil per day. During the 10-week supplementation period the subjects maintained their usual diets and training regimes. Red blood cell (RBC) osmotic fragility, triglycerides and fatty acid composition in plasma were assessed before and after the supplementation period. The pre- and post-supplementation tests of maximal aerobic power, anaerobic power and running performance showed no significant difference between the two groups. Subjects in the omega-3 group had significantly reduced plasma triglycerides, rose EPA (175%) and DHA (40%) in the total lipid fraction of plasma after supplementation. RBC osmotic fragility did not change. In conclusion, the results do not support the hypothesis that endurance athletes can improve maximal aerobic performance by omega 3-fatty acid supplementation

Smith MD, et all (1992) The effect of adding cognitively demanding elements to the performance of a real-world motor task in which functional interference among the elements in performance existed was investigated across level of expertise. The primary task involved running as quickly as possible through a 15.25-m slalom course.

Two secondary tasks were used, dribbling of a soccer ball and identification of geometric shapes projected on a screen located at the end of the slalom course. 4 novice, 5 intermediate, and 5 expert female soccer players served as subjects and performed three trials each of three experimental conditions: running through the slalom course, running through the slalom course while dribbling a soccer ball, and running through the slalom course while dribbling a soccer ball and identifying geometric shapes. Analysis of variance using a 3 (experimental condition) x 3 (level of expertise) design gave significant main effects and a significant interaction. The latter indicated that, although the addition of cognitively demanding elements caused a decrement in performance, the amount of decrement decreased as level of expertise increased. It was concluded that structural interference between elements of performance decreased the positive effect of automation of one element on dual task performance.

Anshel MH, (1995) Warm-up decrement (WUD) is a loss in the level of physical performance following rest and prior to subsequent trials. The activity-set hypothesis is one of several explanations for this phenomenon. The purposes of this study were to field test the efficacy of the activity-set hypothesis and explore the effectiveness of performing closed and open interpolated tasks in reducing WUD. The criterion task was hitting tennis ground strokes in response to a ball tossing machine, an open skill. Elite players ($n = 20$) from a tennis club in New South Wales, Australia, practised either a closed or open task, or rested, prior to resuming the first post-rest trial, using a repeated-measures design. The results yielded partial support of the activity-set hypothesis. Although the closed interpolated task markedly reduced WUD, open skill practice solicited better post-rest performance. Warm-up decrement was clearly evident under the rest condition. Furthermore, post-rest scores were statistically superior for the open skill condition as compared to practising a closed interpolated task, at least for the first two post-rest trials (trials 21 and 22). The implications for these results in reducing WUD are explored within the frameworks of task classification systems and schema theory.

Wrisberg CA, et al (1993) To determine the relative effectiveness of different warm-up activities in eliminating postrest warm-up decrement (WUD), 65 highly skilled tennis players performed 60 forehand and 60 backhand groundstrokes, rested for either 5 or 15 min, engaged in one of five interpolated activities (additional rest, running in place, imagery, practice swings, or air dribbling), and then performed 12 additional forehands and backhands. An analysis of differences between pretest and postrest arousal measures (heart rate, positive cognitive arousal, and negative cognitive arousal) revealed that all of the interpolated activities except additional rest restored arousal to levels near those found at the end of pretest trials. Postrest WUD was also eliminated by practice swings and air dribbling and, to a slightly lesser extent, by running in place. We concluded that an effective warm-up for open skills such as the tennis groundstroke should include some form of overt physical activity that direct the attention of the performer to task-relevant cues.

Anshel MH, (1993) Warm-up decrement (WUD), a phenomenon associated with motor behaviour, is the temporary decrement that occurs when performance resumes after a period of inactivity. The purpose of this study was to examine the extent to which observing a model while concerned about one's own subsequent performance (e.g. a substitute about to enter the sport contest) influences WUD. The subjects were randomly assigned to one of four conditions: (1) observing an ego-involved model demonstrate the criterion skill, (2) observing a model while not ego-involved, (3) ego involvement without modelling and (4) resting (control). Performance outcome (accuracy) and arousal (cognitive and somatic) were assessed. The results of the study indicated that only the combined ego involvement plus modelling condition eliminated WUD. Positive rather than negative emotions and heart rate increased significantly for these subjects after rest. In contrast, the other conditions each exhibited WUD. Heart rate was significantly higher in the 'model and ego' and 'ego only' groups as opposed to 'modelling only' and rest. Implications for using cognitive strategies while observing competitors just prior to entering the contest on reducing WUD are discussed.

Williams HG, et al (1985) to examine the development of movement schema in young school-age children, i.e., whether principles which govern fine eye-hand coordination skill learning as suggested by Schmidt's schema theory apply to the learning of gross motor skills Exp. 1 involved 48 right-handed first-grade children. On a modification of the Fitts Reciprocal Tapping task children moved a stylus (held in the hand or attached to a special shoe worn on the foot) between two metal targets separated by different distances. Children were randomly assigned to one of eight groups: two control or no-practice groups and six experimental or transfer groups. A one-way analysis of variance followed by appropriate Scheffé post hoc tests indicated that movements of the lower limbs were not organized into a movement schema, but a pattern of schema of movement for the upper limbs developed.

That no movement schema developed for lower limb movements suggests development of movement schema is intricately linked to both the existing as well as the potential for developing precise movement in those limbs. Exp. 2 involved 40 first-grade children who were randomly assigned to perform a gross-motor agility task under one of three conditions: direct practice on the criterion task, constant practice on a modification of the criterion task, or variable practice on several different modifications of the criterion task. A groups X trials analysis of variance with appropriate post hoc tests indicated that there were no significant differences among direct, constant, or variable practice groups. Data suggest that the amount of practice may be as important as the type of practice in developing movement schema involved in gross motor skills in young children.

Smith MD, et al (1992) study was the effect of adding cognitively demanding elements to the performance of a real-world motor task in which functional interference among the elements in performance existed was investigated across level of expertise. The primary task involved running as quickly as possible through a 15.25-m slalom course. Two secondary tasks were used, dribbling of a soccer ball and identification of geometric shapes projected on a screen located at the end of the slalom course. 4 novice, 5 intermediate, and 5 expert female soccer players served as subjects and performed three trials each of three experimental conditions: running through the slalom course, running through the slalom course while dribbling a soccer ball, and running through the slalom course while dribbling a soccer ball and identifying geometric shapes. Analysis of variance using a 3 (experimental condition) x 3 (level of expertise) design gave significant main effects and a significant interaction. The latter indicated that, although the addition of cognitively demanding elements caused a decrement in performance, the amount of decrement decreased as level of expertise increased. It was concluded that structural interference between elements of performance decreased the positive effect of automation of one element on dual task performance.

Cè E, et al (2008) the purpose of the study was to provide practical suggestions on the effect of stretching on the maximal anaerobic power preceded by active or passive warm-up. To this aim, 15 relatively fit male subjects (age 23 +/- 0.2 years, height 177 +/- 2 cm, body mass 74 +/- 2 kg; [mean +/- SE]) randomly performed a series of squat jumps (SJ) and countermovement jumps (CMJ). Jumps were preceded alternatively by: i) passive stretching of lower limbs muscles; ii) active warm-up (AWU); iii) passive warm up (PWU); and iv) the joining of stretching with either active warm-up (AWU+S) or passive warm-up (PWU+S). In control conditions (C) only jumps were required. For the 2 jumps the flight time (Ft), the peak force (Pf), and the maximal power (Wpmax) were calculated. It resulted that Ft, Pf, and Wmax values were significantly higher: i) after AWU than after PWU and PWU+S in CMJ; and ii) in AWU as compared to those of other protocols of SJ. Stretching did not negatively affect the maximal anaerobic power, per se, but seems to inhibit the effect of AWU. The results suggested that AWU seemed to increase vertical jump performance when compared to PWU, presumably due to an increase in metabolic activity as a consequence of AWU, which did not occur in PWU, despite the same skin temperature. Passive stretching alone seemed not to negatively influence vertical jump performance, whereas, if added after AWU, could reduce the power output.

Bishop D, (2003) while warm up is considered to be essential for optimum performance, there is little scientific evidence supporting its effectiveness in many situations. As a result, warm-up procedures are usually based on the trial and error experience of the athlete or coach, rather than on scientific study. Summarizing the findings of the many warm-up studies conducted over the years is difficult. Many of the earlier studies were poorly controlled, contained few study participants and often omitted statistical analyses. Furthermore, over the years, warm up protocols consisting of different types (e.g. active, passive, specific) and structures (e.g. varied intensity, duration and recovery) have been used. Finally, while many studies have investigated the physiological responses to warm up, relatively few studies have reported changes in performance following warm up. The first part of this review critically analyses reported changes in performance following various active warm-up protocols. While there is a scarcity of well-controlled studies with large subject numbers and appropriate statistical analyses, a number of conclusions can be drawn regarding the effects of active warm up on performance. Active warm up tends to result in slightly larger improvements in short-term performance (<10 seconds) than those achieved by passive heating alone. However, short-term performance may be impaired if the warm-up protocol is too intense or does not allow sufficient recovery, and results in a decreased availability of high-energy phosphates before commencing the task. Active warm up appears to improve both long-term (>=5 minutes) and intermediate performance (>10 seconds, but <5 minutes) if it allows the athlete to begin the subsequent task in a relatively non-fatigued state, but with an

elevated baseline oxygen consumption ($\dot{V}O_2$). While active warm up has been reported to improve endurance performance, it may have a detrimental effect on endurance performance if it causes a significant increase in thermoregulatory strain. The addition of a brief, task-specific burst of activity has been reported to provide further ergogenic benefits for some tasks. By manipulating intensity, duration and recovery, many different warm-up protocols may be able to achieve similar physiological and performance changes. Finally, passive warm-up techniques may be important to supplement or maintain temperature increases produced by an active warm up, especially if there is an unavoidable delay between the warm up and the task and/or the weather is cold. Further research is required to investigate the role of warm up in different environmental conditions, especially for endurance events where a critical core temperature may limit performance.

Bishop D, (2003) despite limited scientific evidence supporting their effectiveness, warm-up routines prior to exercise are a well-accepted practice. The majority of the effects of warm up have been attributed to temperature-related mechanisms (e.g. decreased stiffness, increased nerve-conduction rate, altered force-velocity relationship, increased anaerobic energy provision and increased thermoregulatory strain), although non-temperature-related mechanisms have also been proposed (e.g. effects of acidemia, elevation of baseline oxygen consumption ($\dot{V}O_2$) and increased postactivation potentiation). It has also been hypothesised that warm up may have a number of psychological effects (e.g. increased preparedness). Warm-up techniques can be broadly classified into two major categories: passive warm up or active warm up. Passive warm up involves raising muscle or core temperature by some external means, while active warm up utilises exercise. Passive heating allows one to obtain the increase in muscle or core temperature achieved by active warm up without depleting energy substrates. Passive warm up, although not practical for most athletes, also allows one to test the hypothesis that many of the performance changes associated with active warm up can be largely attributed to temperature-related mechanisms.

Gray S, et al (2001) aim of this study was to determine the influence of type of warm-up on metabolism and performance during high-intensity exercise. Eight males performed 30 s of intense exercise at 120% of their maximal power output followed, 1 min later, by a performance cycle to exhaustion, again at 120% of maximal power output. Exercise was preceded by active, passive or no warm-up (control). Muscle temperature, immediately before exercise, was significantly elevated after active and passive warm-ups compared to the control condition (36.9 \pm 0.18 degrees C, 36.8 \pm 0.18 degrees C and 33.6 \pm 0.25 degrees C respectively; mean \pm sx) ($P < 0.05$). Total oxygen consumption during the 30 s exercise bout was significantly greater in the active and passive warm-up trials than in the control trial (1017 \pm 22, 943 \pm 53 and 838 \pm 45 ml O₂ respectively). Active warm-up resulted in a blunted blood lactate response during high-intensity exercise compared to the passive and control trials (change = 5.53 \pm 0.52, 8.09 \pm 0.57 and 7.90 \pm 0.38 mmol \times l⁻¹ respectively) ($P < 0.05$). There was no difference in exercise time to exhaustion between the active, passive and control trials (43.9 \pm 4.1, 48.3 \pm 2.7 and 46.9 \pm 6.2 s respectively) ($P = 0.69$). These results indicate that, although the mechanism by which muscle temperature is elevated influences certain metabolic responses during subsequent high-intensity exercise, cycling performance is not significantly affected.

, et al (2002) study was investigated whether active warm-up (AW) would increase muscle **Gray SC** acetylcarnitine concentration before exercise, thereby reducing the reliance on nonoxidative ATP production during subsequent high-intensity exercise. Six female subjects performed a 30-s sprint at 120% of their maximal power output on an electronically braked cycle ergometer 5 min after undertaking an active warm-up. To exclude any effect of muscle temperature (T_m) on metabolism, AW was compared with control (C), which involved passively heating the muscle to the same temperature as that achieved by active warm-up (37.1 \pm 0.3 vs 37.2 \pm 0.2 degrees C AW and C, respectively). Active warm-up significantly increased the concentration of acetylcarnitine from 4.5 \pm 1.5 mmol \times kg⁻¹ dry muscle (dm)⁻¹ at rest to 9.4 \pm 1.6 mmol \times kg dm⁻¹ before the onset of exercise. There was no change in acetylcarnitine concentration in C. During exercise the accumulation of muscle lactate was significantly less in AW compared with C (21.9 \pm 3.8 vs 34.3 \pm 2.3 mmol.kg dm, respectively). The main finding of this study was that there was less accumulation of blood and muscle lactate during intense dynamic exercise preceded by active warm-up, which could not be accounted for by a difference in T between trials immediately before the onset of exercise (m).

Robergs RA, et al (1991) study was investigated the effects of preliminary exercise (warm-up) on glycogen degradation and energy metabolism during intense cycle ergometer exercise. After determination of $\dot{V}O_{2max}$, six male subjects were randomly assigned to perform warm-up (WU) and no warm-up (NWU) trials

incorporating a 2 min standardized sprint ride (SR) at 120% of the power output attained at VO₂max (PO_{max}). Muscle biopsies and temperature (T_m) recordings were obtained from the vastus lateralis muscle. T_m was elevated above the resting level prior to the SR during the WU trial (37.7 +/- 0.1 vs 35.4 +/- 0.4 degrees C; P less than 0.05) and remained higher than the NWU trial after the SR (38.6 +/- 0.2 vs 37.1 +/- 0.4 degrees C; P less than 0.05). Similar trends existed for rectal temperature (Tr). The increases in T_m and Tr during the SR were both greater in the NWU trial (P less than 0.05). Muscle glycogen degradation was similar for the WU and NWU trials (30.8 +/- 3.7 vs 25.6 +/- 3.7 mmol.kg⁻¹, respectively). When blood and muscle lactate concentrations after the SR were expressed relative to values before the SR, the WU trial resulted in a lower accumulation of blood lactate (6.5 +/- 0.9 vs 10.7 +/- 0.8 mEq.l⁻¹; P less than 0.01) and muscle lactate (20.1 +/- 0.1 vs 23.4 +/- 2.2 mEq.kg⁻¹ wet wt.; P less than 0.05). Furthermore, oxygen consumption during the 1st min of the SR was higher in the WU trial (2.3 +/- 0.2 vs 1.9 +/- 0.2 l.min⁻¹; P less than 0.05).

Malina RM, et al (2005) the aim of this study was to estimate the contribution of experience, body size and maturity status to variation in sport-specific skills of adolescent soccer players. The participants were 69 players aged 13.2-15.1 years from three clubs that competed in the highest division for their age group. Height and body mass were measured and stage of pubic hair development was assessed at clinical examination. Years of experience in football was obtained at interview. Six football skill tests were administered: ball control with the body, ball control with the head, dribbling with a pass, dribbling speed, shooting accuracy and passing accuracy. Multiple linear regression analysis was used to estimate the relative contributions of age, stage of sexual maturity, height, body mass and years of formal training in soccer to the six skill tests. Age, experience, body size and stage of puberty contributed significantly but in different combinations to the variance in four of the six skill tests: dribbling with a pass (21%; age, stage of maturity), ball control with the head (14%; stage of maturity, height, body height x body mass interaction), ball control with the body (13%; stage of maturity, years of training) and shooting accuracy (8%; stage of maturity, height; borderline significance, P = 0.06). There were no significant predictors for the tests of dribbling speed and passing accuracy. In conclusion, age, experience, body size and stage of puberty contributed relatively little to variation in performance in four of the six soccer-specific skill tests in adolescent footballers aged 13-15 years.

, et al (2007) to evaluate the growth, maturity status and functional capacity of youth **Malina RM** soccer players grouped by level of skill. The sample included 69 male players aged 13.2-15.1 years from clubs that competed in the highest division for their age group. Height and body mass of players were measured and stage of pubic hair (PH) was assessed at clinical examination. Years of experience in football were obtained at interview. Three tests of functional capacity were administered: dash, vertical jump and endurance shuttle run. Performances on six soccer-specific tests were converted to a composite score which was used to classify players into quintiles of skill. Multiple analysis of covariance, controlling for age, was used to test differences among skill groups in experience, growth status and functional capacity, whereas multiple linear regression analysis was used to estimate the relative contributions of age, years of training in soccer, stage of PH, height, body mass, the height x weight interaction and functional capacities to the composite skill score. The skill groups differed significantly in the intermittent endurance run (p<0.05) but not in the other variables. Only the difference between the highest and lowest skill groups in the endurance shuttle run was significant. Most players in the highest (12 of 14) and high (11 of 14) skill groups were in stages PH 4 and PH 5. Pubertal status and height accounted for 21% of the variance in the skill score; adding aerobic resistance to the regression increased the variance in skill accounted for to 29%. In both regressions, the coefficient for height was negative. Adolescent soccer players aged 13-15 years classified by skill do not differ in age, experience, body size, speed and power, but differ in aerobic endurance, specifically at the extremes of skill. Stage of puberty and aerobic resistance (positive coefficients) and height (negative coefficient) are significant predictors of soccer skill (29% of the total explained variance), highlighting the inter-relationship of growth, maturity and functional characteristics of youth soccer players.

Figuredo AJ., et al (2011) Predictors of functional capacities and skills in 143 soccer players aged 11-14 years from five clubs in Portugal were investigated. Data for players aged 11-12 (n=75) and 13-14 (n=68) years included chronological age, skeletal age, stage of pubic hair (PH), anthropometry, four functional capacities, four soccer skills and experience; composite functional and skill scores were derived. Multiple linear regression analysis

was used to examine the independent effects of age, maturity, body size and proportions, adiposity and experience on individual functional capacities and skills and composite scores. Explained variances differed among functional capacities (22-48%) and skills (<25%), and were greater for composite functional (younger 37%, older 58%) than skill (younger 26%, older 18%) scores. Skeletal maturity was a predictor of the counter-movement jump in both groups and of composite functional and skill scores in older players. Age and adiposity were primary predictors in players aged 11-12 years, while experience and a proportionally longer trunk (conversely, relatively shorter lower extremities) appeared among predictors in players aged 13-14 years. PH was not among predictors. Except for the counter-movement jump, predictors of functional capacities and soccer skills differed between age groups.

Figueiredo AJ., et al (2009) examined the Participants in many youth sports are commonly combined into age groups spanning 2 years. The study compared variation in size, function, sport-specific skill and goal orientation associated with differences in biological maturity status of youth soccer players within two competitive age groups. The sample included 159 male soccer players in two competitive age groups, 11-12 years (n=87) and 13-14 years (n=72). Weight, height, sitting height and four skinfolds, four functional capacities, four soccer skills and goal orientation were measured. Skeletal maturity was assessed using the Fels method. Each player was classified as late, on time or early maturing based on the difference between skeletal and chronological ages. ANOVA was used to compare characteristics of players across maturity groups. Late, on time and early maturing boys are represented among 11-12-year-olds, but late maturing boys are under-represented among 13-14-year-olds. Players in each age group advanced in maturity are taller and heavier than those on time and late in skeletal maturity, but players of contrasting maturity status do not differ, with few exceptions, in functional capacities, soccer-specific skills and goal orientation. Variation in body size associated with maturity status in youth soccer players is similar to that for adolescent males in general, but soccer players who vary in maturity status do not differ in functional capacities, soccer-specific skills and goal orientation.

Russell M., et al (2010) examined the reliability and construct validity of new soccer skills tests. Twenty soccer players (10 professional and 10 recreational) repeated trials of passing, shooting, and dribbling skills on different days. Passing and shooting skills required players to kick a moving ball, delivered at constant speed, towards one of four randomly determined targets. Dribbling required players to negotiate seven cones over 20 m. Each trial consisted of 28 passes, 8 shots, and 10 dribbles. Ball speed, precision, and success were determined for all tests using video analysis. Systematic bias was small (<9% in all measures) and all outcome measures were similar between trials. Test-retest reliability statistics were as follows: ball speed (passing, shooting, dribbling; coefficient of variation [CV]: 6.5%, 6.9%, 2.4%; ratio limits of agreement [RLOA]: 0.958 \times/\div 1.091, 0.990 \times/\div 1.107, 0.993 \times/\div 1.039), precision (passing, shooting, dribbling; CV: 10.0%, 23.5%, 4.6%; RLOA: 0.956 \times/\div 1.147, 1.030 \times/\div 1.356, 1.000 \times/\div 1.068), and success (passing, shooting, dribbling; CV: 11.7%, 14.4%, 2.2%; RLOA: 1.017 \times/\div 1.191, 0.913 \times/\div 1.265, 0.996 \times/\div 1.035). Professional players performed better than recreational players in at least one outcome measure for all skills. These findings demonstrate the reliability and validity of new soccer skill protocols.

Taskin H., et al (2008) aim of this study is to evaluate sprinting ability, density of acceleration, and speed dribbling ability of professional soccer players with respect to their positions. A total of 243 professional soccer players were examined. These soccer players are playing in different leagues of Turkey. The F-MARC test battery, which was designed by FIFA, was used for soccer players. We did not find any statistical differences for 30-m sprint test and four-line sprint test values with respect to positions of soccer players ($p > 0.05$). On the other hand, there was a statistical difference for speed dribbling test values in terms of positions of soccer players ($p < 0.05$). It was found that the test values of defense players, midfielders, and forwards were better than the test values of goalkeepers ($p < 0.05$). In conclusion, this study, which was done during the training season, shows that there is a similarity between the abilities of professional soccer players for 30-m sprint and four-line sprint tests. Therefore, it is believed that there must be fast players in all positions in terms of sprint ability. There is a similarity among defenders, midfielders, and forwards in terms of speed dribbling ability; in contrast, the speed dribbling ability of goal keepers is different from the players in those three positions. Although there are many more speed dribbling exercises within the training programs of defenders, midfielders, and forwards, the speed dribbling ability test is not used much for goal keepers. Correspondingly, speed dribbling ability is not a specific indicator for goal keepers, and this test should not be used for the choice of goalkeepers.

Svensson M., et al (2005) to cope with the physiological demands of soccer, players must be competent across several fitness components. The use of fitness tests in the laboratory and field assist in examining soccer

players' capabilities for performance both at the amateur and elite levels. Laboratory tests provide a useful indication of players' general fitness. Accurate test results can be obtained with the use of a thorough methodology and reliable equipment. Laboratory tests are used sparingly during the season because of the time-consuming nature of the tests. Instead, tests are generally carried out at the start and end of the pre-season period to evaluate the effectiveness of specific training interventions. Field tests provide results that are specific to the sport and are therefore more valid than laboratory tests. The reduced cost, use of minimal equipment and the ease with which tests can be conducted make them more convenient for extensive use throughout the season. Although data from laboratory and field tests provide a good indication of general and soccer-specific fitness, individual test results cannot be used to predict performance in match-play conclusively because of the complex nature of performance in competition. Fitness tests in conjunction with physiological data should be used for monitoring changes in players' fitness and for guiding their training prescription.

Stone Kj, et all (2009) aim of the study was to examine the effect of fatigue, developed during prolonged high-intensity intermittent exercise, on the performance of soccer shooting and dribbling skill. Nine semiprofessional soccer players with a mean age of 20.7+/-1.4 years volunteered to participate in the study. Participants completed a slalom dribble test and the Loughborough Soccer Shooting Test (LSST), before and directly following the performance of three 15-min bouts of a modified version of the Loughborough Intermittent Shuttle Test (LIST). Mean heart rates and mean 15-m sprint times remained unchanged across the three bouts of the LIST. Following the LIST slalom dribbling time increased significantly by 4.5+/-4.0% (P=.009), while the mean total points scored during the LSST was significantly reduced by 7.6+/-7.0 points (P=.012). When fatigued the frequency of shots in the LSST achieving the highest score of 5 points was reduced by 47% while the frequency of shots achieving the lowest 0 point score increased by 85%. Results show that while 45 min of exercise caused no decrements in sprint performance there were significant reductions in the ability to perform soccer-specific skills. Both the speed (dribbling time) and accuracy (shot performance) with which soccer-specific skills were executed was impaired following exercise replicating one-half of a soccer match.

Chapter-III

Procedure

In this chapter the selection of the subjects, criterion measures, administration of test, reliability of the data procedure of giving warm-up and statistical procedure was used are described.

Subjects

Twenty (N=20) soccer players of Lakshmbai National Institute of physical education, Gwalior who were regularly repotting for soccer practice during the coaching period. Subjects were selected randomly for the study. Their age ranged between 18-25 years according to college records. All the subjects were residents in the hostel of the institute. The subjects had their regular training in physical activities as a part of their routine programme of the college.

The requirements of the projects were explained to all the subjects and a through orientation of the testing procedure was carried out so that the subjects could give their best performance in the tests and there was no ambiguity the efforts which was required on the part of the subjects.

Criterion Measures

Following criterion measure were selected for testing the hypothesis on the present study:

1. Kicking for Distance : it was recorded in yards.
2. Dribbling was recorded in 1/20R second.

Procedure for Administering the Test

After carefully going through the available literature pertaining to soccer skill tests in the college library the research scholar selected Warner's test of soccer skill. For the purpose of this study only two test

items. Namely dribbling for time test and kicking for distance test were selected. The tests were conducted strictly following the instruction as give in the book “A practical approach to measurement in physical education”. All the tests were conducted by the research scholars himself with the help of a group of master’s degree students of the college who were thoroughly oriented in the procedure of conducting the tests.

The tests were administered consecutively on five days preceded by no warm-up on the first day. Three minute warm-up on the second day, six minute warm-up on the third day and nine and twelve minute warm-up on fourth and fifth days respectively.

The test was administered at the soccer field of the Lakshmibai National Institute of physical education, Gwalior, in India. The soccer skill tests administered to the subjects are explained as under:

Dribbling for Time Test

Purpose:

Dribbling for time test to measure to endurance and agility of the performer.

Equipment:

Five cones, Soccer Balls, Stop Watch.

Marking:

Five cones were fixed five yards apart from each other on a straight line. A restraining line was draw on the ground five away from the first obstacle as shown in figure- 1.

Procedure:

A straight line was drawn and 5 flag posts (A,B,C,D,E) were fixed in straight line with 3 meters apart in between. The line of flag posts was perpendicular to the starting line, which is shown in Fig. No. 1.

On the signal “Go” the subject dribbled the ball from the starting line to the right and left of the flag posts alternately. But, he made a ‘U’ turned around E and returned back in the same manner till he crossed the starting line with the ball at the same time as shown in Fig. No.1.3 trials were given to each subject.

Instruction

If the ball went out of control, the subject was asked to retrieve he ball and resume dribbling from where the ball went out.

Scoring

The best timing of 3 trials was recorded in the nearest $1/100^{\text{th}}$ of a second and taken as the score of the subject.

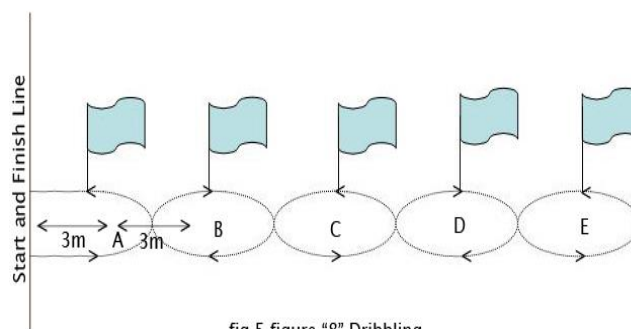


fig 5 figure "8" Dribbling

Kicking for Distance

Purpose:

Kicking for distance to measure kicking ability for distance with a degree of accuracy.

Equipments:

Ten soccer balls, measuring tap

Marking:

Two straight lines were drawn 25 yards apart and parallel to each other. Another line was drawn to join these two parallel line at one end, which was used as restraining line as shows figure-2. From the restraining line distance were marked at five yards interval s along the parallel lane. The distance the ball advanced in the air was measure at the first bounce.

Scoring:

The distance from the restraining line to line to the sports where the ball landed first within 25 yards wide lane was recorded to the nearest yard. Best of three trails was recorded as performance of each subject.

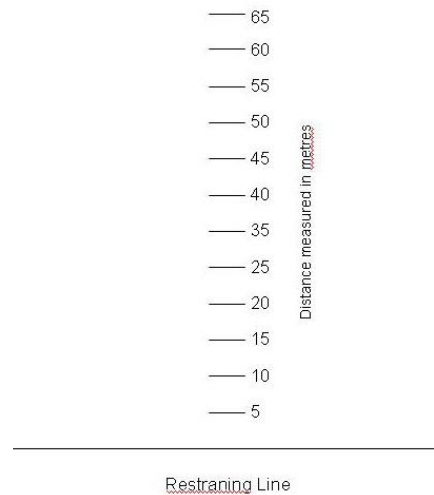


Fig. No.2 Kicking For Distance

Reliability of Data

Reliability of data was established by test retest method. The tests were repeated with one day gap on 20 randomly selected subjects. The co-efficient of correlation was computed by using person’s product moment correlation methods. The reliability co-efficient of correlation are presented in the

Table -1

Table-1
Reliability Co-efficient of the Re-test Score with Different Type of Warm-up in Kicking for Distance and Dribbling for Time

Variables	Co-efficient Correlation
Kicking for Distance	0.97
Dribbling for Time Test	0.95

Selection and Administration of Warming-up Programme

The warming-up programme was administered by the research scholar, only one a time for the duration of 3 minute, 6 minute, 9 minute and 12 minutes. After each duration of warm-up, kicking for distance and dribbling for time test were administered. All exercise of warming-up programme were demonstrated to the subjects by research scholar, and the subjects performed them under very careful supervision, so that the effect of the exercise was properly realized, soon after the completion of the warming-up the subjects were tested in soccer skill. Warming-up was given to ten subjects at a time and after the completion of warm-up five subjects each reported for dribbling for time test and kicking for distance test. To conduct test for all subjects at the same time two testing for each test were established.

Statistical Procedure:

The find out the effect of warm-up on different duration on soccer skill performance one way analysis of variance (F-ratio) were used. The level of significance was set at 0.05 levels.

Chapter-IV

ANALYSIS OF DATA AND RESULTS OF STUDY

The statistical analysis of data for kicking for distance and dribbling for accuracy collected on 20 subjects after administering warm-up of different duration is presented in this chapter.

Level of Significance

The differential effect of different duration of warming-up on selected soccer skill tests was determined using an analysis of variance. The level of significance was set at 0.05 level of confidence, which was considered adequate for the purpose of this study.

Finding

To find out the effect of warm-up of different duration on selected soccer skill performance One way analysis of variance (F-ratio) as well as LSD Test were used. The Data resulting to this presented in the table-2.

Table-2
Analysis of Variance of Data on Soccer Skill test Administered after Different Duration of Warm-up

Skill test	Source of variance	D.F.	Sum of square	Mean sum of square	"F" Value
Kicking for distance	Between Group	4	500.74	125.185	3.43*
	Within Group	95	3469.45	36.52	

Tables 2 reveals that in case of test kicking for distance 'f' value was significant at 0.05 levels, and value of calculated 'F' was 3.34 which were more than tabulated F value i.e. 2.48 at 0.05 level of significance. It shows that after giving different duration of warm-ups there was variability of performance in skills, they were statistically significant and LSD test was applied.

Table – 3
Significance Difference of Means of the Test Kicking for Distance Performed after Different Duration of warm-up

Without warm-up	3min.warm-up	6min.warm-up	9min.warm-up	12min warm-up	M.D	C.D.
47.4	49.5				2.1	3.78
47.4		51.35			3.95*	3.78

47.4			52.65		5.25*	3.78
47.4				53.65	6.25*	3.78
	49.5	51.35			1.85	3.78
	49.5		52.65		3.15	3.78
	49.5			53.65	4.15*	3.78
		51.35	52.65		1.3	3.78
		51.35		53.65	2.3	3.78
			52.65	53.65	1.0	3.78

*significant difference at 0.05 levels.

Table-3 reveals that significance differences obtained in between the performances of means of kicking for distance after different duration of warm-ups. Thus results of LSD test shows that there is a mean significance difference between the no warm-up v/s 6min. warm-up(3.95), no warm-up v/s 9min. warm-up(5.25), no warm-up v/s 12min warm-up(6.25), and 3min. warm-up v/s 12min. warm-up(4.85) higher than the table-value (3.78), where as there is no significance difference between the mean of no warm-up v/s 3min.warm-up (2.1),3min.warm-up v/s 6min. warm-up (1.85),3min. warm-up v/s 9min. warm-up(3.15), 6min.warm-up v/s 9min warm-up(1.3),6min.warm-up v/s 12minwarm-up(2.3) and 9minwarm-up v/s 12minwarm-up(1.0)lower than the tabulated value(3.78).

Table-4
Analysis of Variance of data on Soccer skill test Administered after
Different Duration of Warm-up.

Skill test	Source of variance	D.f.	Sum of squire	Mean sum of squire	'F'
Dribbling for Time Test	Between Group	4	23.01	5.75	1.66
	Within Group	95	329.81	3.47	

*significant at 0.05 Level

Tabulated $0.05(4, 95) = 2.48$

Table 2 reveals that in case of dribbling for time 'F' value was significant at 0.05 level. And Values of calculated 'F' for test dribbling for time was 1.66 respectively which was less than tabulated. i. e. 2.48 at 0.05 level of significance. It shows that after giving different duration of warm-ups there was no variability of performance in skill. Finding of the study showed significant difference in different duration of warm-up of 6 min, 9 min and 12 min on kicking performance in soccer. It was also evident that there is no significant difference in different duration of warm-up.

Discussion of Finding

Warm-up plays an important role in enhancing performance of sportsmen in various games and sports. Warm-up is more vital for those activities in which quick movement and fast running are involved. It improves performance by increasing the strength rate and strength one muscle contraction, increasing muscle co-ordination and helps to prevent injuries. As a result of warming-up the local temperature in the muscle increase which in turn increase the muscle reaction time, muscle speed and muscle excitability and also decrease the duration of action potential in the muscle.

It is evident from finding thst there was significant difference duration warm-up of 6 minute, 9 minute and 12 minute on kicking performance in soccer. It is also evident that there is no difference of duration of 3 minute.

On dribbling performance in soccer. This may be attributed to the fact the aim of warm-up is to pump fresh oxygenated blood to the aware and increasing the heart rate. This provides a maximum oxygen supply to the body and helps to eliminate the waste products of exercise from the working muscles. Finally warming-up properly helps to protects the body from becoming overstressed, prepare it for the demands of heave has training and reduces the chance of injury such as sprain or strain and strain and has nothing to do with performance especially in higher skill like soccer. Warming up is to prepare the body for skill execution. The performance in any skill oriented game is directly proportional to the technique development. In a game like

soccer where the explosive kind of movement leads to more chance of injury, the body should be prepared while using any kind of warm up, to carry out the work in an easier way. The movement in all types of warm-up are more or less similar exact that there might have some variation in resistance while working in different mode of exercise.

Actually, warming up is not any way contributing factor to the performance in case of dribbling. For performance dribbling is various factor like technique in physical Standards of sportsman, psychological make-up of sportsman on the day of testing or performance etc contribute to the execution skill. Probably for above set of reason in significant relations were obtained in dribbling between types of warm-up.

The present result of the study are in consonance with the finding of R.H.Rochelle, Ingjer and strome, Severion, Robert J, Majavin, Gary Fremodt Hasen, William Foster Glidewell, Teaque, Robert W. Schutz, Graham E. Benedict, Shibnath Jha and F.G. Bissel.

The propose Hypothesis that there may be significant in soccer is rejected at 0.05 level of significance but on dribbling performance in soccer is accepted at 0.05 level of significance.

Chapter-V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was undertaken to find out the differential effects of warm-up of different duration on soccer skill performance. Twenty soccer players of Lakshmbai National Institute of physical education, Gwalior, India. Were randomly selected as subjects for this study. Two tests items of warmer test of soccer skill, namely dribbling for time test and kicking for distance test were administered to the subjects after no warm-up and three, six, nine and twelve minute duration of warm-up respectively on five consecutive days to obtain data. The data was obtained and recorded, and analyzed statistically. One way analysis of variance was employed to compute the differential effects of the different duration of warm-up on soccer skill tests. Score of dribbling for time test and kicking for distance test after different duration of warm-up were analyzed separately. The 'F' value (3.43) was found to have significant difference at 0.05 level of confidence in the performance of kicking for distance test after giving different duration of warm-up. In case of dribbling for time test 'F' value was(1.66).

There was no significance difference in performance after administering different duration of warm-up. Since the mean difference in kicking for distance showed significant f ration, to find out which of the difference of means amongst different duration of warm-up were statistically significant. The LSD test was used and the results showed that six, nine and twelve minute duration of warm-up were superior to no war-up.

Conclusions

Within the limitations of the present study the following conclusions may be drawn.

1. Warm-up of different durations has differential significant effects on kicking for distance test, where as soccer dribbling for time test warm-up of different duration did not show any differential effects.
2. Six, nine and twelve minute duration of warm-up were found to be superior as compare to no warm-up and three minute warm-up for improving performance in kicking for distance test.
3. There was no difference in the effects of three minute duration of warm-up and no warm-up on kicking for distance.
4. There was no different in the effects of three, six, nine and twelve minutes duration of warm-up session in performance of dribbling for time test.
5. Physical education teachers and coaches are not devote much time in warm-up in dribbling skills because warm-up does not improve performance of dribbling for time test.

Recommendations

1. It is recommended that for soccer skill which involve fast running and quick actions.
2. Soccer players should not have longer duration of warm-up for improving their performance.
3. Similar study may be conducted on various other soccer skills.
4. A study may be carried out by giving different intensity and duration of warm-up.
5. Similar study may be conducted on different age and sex groups of soccer players.

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