CHAPTER -1

INTRODUCTION
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Introduction

The latest training trends have been the area of search for all sports personnel including coaches, athletes, strength and conditioning specialists to improve their performance. The role of core fitness has been realized in sports performance. Almost all the sport indicate requirement of transfer of force from core to limb. For example, while throwing a baseball, the arm produces a contralateral external oblique and prodecdings that stimulate a pattern of muscle activation (Hirashima et al., 2002). Limb movement is controlled by the functional kinetic chain that is the core; and increasing core fitness contributes to athletes in terms of force production, strengthen spinal stability, and aid in injury prevention and rehabilitation (Akuthota & Nadler, 2004).

The core structures are the passive structures within abdominals, paraspinals and gluteals, hip girdle musculature, pelvic floor and the active contributions of the trunk musculature that provides strength and stability to the body (Willson et al., 2005 & Richardson, 2009).

Core stability is the capacity of body that resume or maintain a related position of the trunk as a result of contingent on neuromuscular control stimulated by the internal and external forces under the perturbation. Core stability is known as the base of trunk dynamic control that allows transfer, production, control of force and motion to distal segments of the kinetic chain (Kibler, Press & Sciascia, 2006).

There are 29 pairs of muscles designated as core muscles that help to stabilize functional movements of the spine, pelvis and kinetic chain. The optimum control and efficiency of the system can be achieved when the forces are distributed appropriately on the joints of the kinetic chain. The muscles requires an integration of the myofascial, articular, and neural systems to obtain the
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maximum efficiency. The muscles have ability to contract in a coordinated manner due to neuromodulation which provides sufficient motor control to the joints. This control leads to adequate compression to the joints through the articular structures. This model supports an integrated model of joint function (Lee, 2009).

Table 1.1: Various Muscles of Core region

<table>
<thead>
<tr>
<th>Muscles of Core Region</th>
<th>Abdominals region</th>
<th>Hip musculature</th>
<th>Spinal Musculature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectus abdominals, transverses</td>
<td>Iliopsoas; Rectus femoris; Sartorius;</td>
<td>Erector Spine; Quadrates lumborum;</td>
<td>Paraspinals: Trapezius; Psoas Major;</td>
</tr>
<tr>
<td>Abdominis, internal and external abdominal obliques</td>
<td>Tensor fasciae latae; Pectineus; Gluteus maximus, medius and minimus; Semitendinosus; Semimembranosus; Biceps femoris; Adductor brevis, longus, and magnus; Gamellus superior and inferior; Obturator internus and externus; Quadrates femoris; Piriformis</td>
<td>Multifidus; Iliacastails lumborum and thoracic; Rotators; Latissiums dorsi; and Serratus anterior.</td>
<td></td>
</tr>
</tbody>
</table>

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Importance of core muscle development can be underline in many functional and athletic activities as it enhances core stability and proximal stability to facilitate distal mobility. The appropriate timing and tension of core muscles contracting in sequence may enhance the optimal stability of both deeper and superficial core muscles (McGill, 2003).

An athlete, trained with specific training for concerned sport for eg an athlete sprinter who trains only leg muscles shows inferior performance as compared to the athlete who takes training of core muscles ie abdominal muscles as well as upper body muscles which leads to better dynamic balance and coordinated movement of upper and lower limb, essential for sprint performance.

Core muscles controls the core of the body that helps to maintain posture during movement. Core muscles creates costant contraction of abdominal muscles especially at the region of transverse abdominis. The development of core muscles benefits in increasing proprioception abilities including strength, endurance, power and speed. Core stability describes a general phenomenon that cover the training of the lumbopelvic region and abdominal region. The combination of a local and global stability system are used to define core stability (Behm & Bergmark, 1989, 2002).

One can expect sense of better well being and quality of life to the desired level, by achieving correct body composition by means of proper diet & exercise. These practices will also leads to better management of stress in the life. There are two major components that constitute body composition, one is body fat and other is lean body weight. Anthropometric parameters are used for measuring most of the body composition variables. Following are the variables which helps in understanding body composition:
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Table 1.2: This variables gives a appropriate picture of body composition

<table>
<thead>
<tr>
<th>Body Composition Variables</th>
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</thead>
<tbody>
<tr>
<td>1. Body Mass Index</td>
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<tr>
<td>2. Body Surface Area</td>
</tr>
<tr>
<td>3. Body Fat%</td>
</tr>
<tr>
<td>4. Absolute Total Body Fat</td>
</tr>
<tr>
<td>5. Essential Fat Mass</td>
</tr>
<tr>
<td>6. Non Essential Mass</td>
</tr>
<tr>
<td>7. Lean Body Mass</td>
</tr>
<tr>
<td>8. Fat Free Body Mass</td>
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<tr>
<td>9. Bone Mass</td>
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<tr>
<td>10. Bone Density</td>
</tr>
</tbody>
</table>

Body composition plays a vital role in athletic performance. Better management of body fat and lean body mass through exercise, reduces body fat and increases lean body weight and is important for sedentary individual as well as for athletes. An increase in lean body weight helps to alleviate sports performance. Literature substantially indicate that a fat free body weight is an important factor in activities where the total body weight must be moved and contributes in higher levels of physical performance (Shaver, 1981).

Physical fitness of an individual is also affected by the quality of the core. Physical fitness can be defined as ability of an individual to carry out his/her daily routine activities efficiently and is still left with ample energy to cope up with any emergency, if arises. Physical fitness consist of various components viz Strength, Endurance, Flexibility, Balance and Coordinative ability.

Strength refers to the ability to overcome resistance or an action taken against resistance. strength can’t be just considered as contraction of muscles, but
it is a product of voluntary muscles contraction controlled by the neuro muscular system.

Ability of the human body to maintain a certain level of energy production for longer duration is termed as Endurance. The physiological basis of endurance is aerobic capacity, efficiency of which improves ability to perform under condition of fatigue.

Flexibility refers to the ability to execute movement with greater amplitude or range. Sometimes stretchability, elasticity, suppleness, mobility are also equated with flexibility. The muscles and ligament have the special qualities of stretchability and elasticity. These qualities provide ease to the concerned tissue to regain their normal length without any effect.

Coordinative abilities are primarily dependent on the motor control and regulation process of central nervous system. These enable the sportsmen to do a group of movement with better quality and effect.

Training is a systematic process of repetitive progressive exercise or work involving learning process and acclimatization (Daniel, 1985). Sports training refers to the physical, technical, intellectual and moral preparation of an athlete by means of physical exercises (Harre, 1982). Sports performance can be improved through sports training.
Sports training also refers to specialized methods and strategies that is used in a variety of sports in order to develop and prepare the athletes for sport performances. In addition to traditional types of training, other training methods are also imparted to athletes which include:

   a) Core Training  
   b) Cross training  
   c) Boxing training  
   d) Altitude training  
   e) Endurance training  
   f) Fartlek training

Core muscles training is broadly used to improve strength, conditioning, health, fitness, and rehabilitation with claims of increasing performance and prevent from the risk of injuries (Mcgill, 2001). Similarly it was believed by the sports professionals that in the field of strength and conditioning program, core muscles strength training is one of the important component for improvement of athletic performance and to reduced the risk of injuries. Despite the strong belief in these ostensible positive effects, limited scientific studies have shown no direct relationship between athletic performance and core muscles (Cosio-Lima, 2003, Scibek, 2001, Stanton, 2004).

Core strength training can be used in training program for better posture, health and fitness, rehabilitation, for improving performance and for injury prevention. Core training is a new concept for the fitness industry but athletes and coaches have understood its value for many years. The core region consists of hip musculature region, the abdominal muscles & spinal region. The basic aim of the core training is to target all the muscles regions and gives stability to the spine and pelvis. These muscle groups are critical for the energy transfer from large to small body parts during many sports activities (Retrieved from http://www.sport-fitness-advisor.com). Core stability is important for maintain
correct alignment of the spine and pelvis while the limb is moving (Leetun et al., 2004).

The cornerstone of all athletic movement is the abdominal or core muscles (Edell, 2005). An athlete can be trained to increase the fitness components ie, power, speed, strength, agility and quickness, but if the core muscles are weak the athlete will not able to perform the skills.

Core strength is essential for improvement of strength and the ability of the neuromuscular system to generate force, and stabilizes kinetic chain dynamically, the core musculature also helps to protect it from unwanted forces that are part of functional movements (Richardson et al., 2002).

**Statement of the Problem**

The purpose of the study was to find out status of core muscle strength & fitness level of University level players & to study the Effect of Core Training on Selected Fitness and Body Composition Variables in Selected Male Players.

**Objectives**

1) To find out the Core muscle strength and fitness level of male & female Inter University players.
2) To observe the effect of core training on the fitness components of male players.
3) To observe the effect of core training on body composition of male players.
4) To prepare core training program for male players.
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Hypothesis

It is hypothesized that core muscles strength training does not enhance the performance of the athlete on selected fitness components and body composition variables.

Significance of the Study

1) The result of the study would help to understand importance of core muscles strength training.
2) The result of the study would help to incorporate core training along with other training program.
3) The result of the study would help to provide base line data for core strength.
4) The training program of the present study can be used as module and can form base to prepare other training module for core training.

Delimitations

1) The study was delimited to male and female players of Interuniversity level, Pt. Ravi Shankar Shukla University, Raipur and students of School of Studies in Physical Education.
2) It was further delimited to selected variables, which were measured to assess core muscles strength and body composition of selected male and female players.
3) The experimental part of the study was delimited to subjects aged 18-25 years enrolled in School of Studies in Physical Education, Pt. Ravi Shankar Shukla University, Raipur.
4) The study was delimited to Eight week core muscles strength training program prepared for the present study.
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Structure of Core Muscles

Fig 1.1: Spinal musculature

Fig 1.2: Hip musculature

Fig 1.3: Structure of Core