“Pursuing excellence is a journey, a path of self discovery. This is a journey of the commitment, the practice and the experience” (Mohan, 2011). But the excellence in sport is always associated with the inherent risk of getting injured. Sport injury is an unanticipated event for an athlete, and not always, an athlete is prepared to deal with this aberrant feel of an injury (Mohan, 2010).

“Getting injured is a traumatic experience for athletes; what they have devoted so much time and energy to, can be suddenly, without warning, taken away” (Crossman, 1997, p. 334). Thus, the sport injury is an unfortunate outcome of participation in athletic activity (Walker et al., 2007).

SPORT INJURY AND RELATED RESEARCH: THEORETICAL CONSIDERATIONS

The participation in sport has put enormous amount of stress and strain on the mental and physical well being of players (Davies, 1981). Conversely, participating in athletics has many benefits too. The benefits accrued from physical activity in terms of health as well as mental and physical well being for individual and society at large, are well established (Forward, 1988). With increased promotion of participation in sport because of its preventive role in the management of a number of conditions like coronary heart disease, diabetes, osteoporosis, hypertension and mental health disorders, attention should also be paid towards the potential risk of rise in sport injuries (Plante & Rodin, 1990).

It has been observed that participation in sport has increased manifold in the recent years because of which the rate of injury occurrence has also risen (Crossman, 1997). The literature on epidemiology of sport injury confirm a high incidence of injuries occurring at every level of sport participation, be it amateur or elite, and these injuries range from minor cuts and bruises to severe injuries like spinal cord and head injuries. Around millions of athletes across the globe sustain sport injury in one form or the other each year, resulting in billions of dollars spent on treatment. The injuries range from minor ones requiring minimal medical treatment to those requiring costly...
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diagnostic testing, surgery and rehabilitation. The sport injuries also result in decreased performance both on and off the field (Petitpas & Brewer, 2004).

Globally, participation in sport for health benefits, fitness and for recreation has emerged as a major public health concern. Indeed, it has a positive effect on cardiovascular health, on rising rates of obesity and also has the potential to curb onset of diseases related to sedentary lifestyle. But, participation in sport is also always associated with the risk of getting injured (Gabbe et al., 2005).

The systematic recommendations for participation in sport by health promotion campaigns emphasizing it to be the most important component for healthy habits possibly entails harm, both at personal and social level, as it results in absenteeism from the professional work (Chamorro et al., 2009). Participating in sport is a major source of fun but at times it results in enormous negative consequences (Sysyema et al., 2010).

SPORT INJURY SPECTRUM: DEFINITION

The wealth of literature provides insight into the varied definitions of sport injuries. According to Woo and Buckwalter (1988), the word sport injury, has come from the Latin word, *injure*, meaning to make unjust, not right, and is defined as the loss of cells or extracellular matrix resulting from sports-induced trauma.

As per the Council of Europe definition, a sport injury is, “an injury that occurs while participating in sport and leads to one of the following consequences: a reduction in the amount or level of sports activity, the need for advice or treatment, and or adverse economic or social effects” (van Mechelen et al., 1992).

There is no uniform consensus in the definition of a sport injury in literature. Few researchers (Baarveld, 2004; Burt & Overpeck, 2001), recently advocated the use of term “sports-related injury” rather than “sports injury” which according to them is more comprehensive. The term “sports-related injury” denotes any injury that affects the individual’s ability to engage into sports activities irrespective of where the injury was sustained. The term also includes injuries sustained during non-sporting activity as shown in Table 1A (Baarveld et al., 2011).
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TABLE 1A
Definition of Sports-Related Injury

<table>
<thead>
<tr>
<th>A sports-related injury is defined as:</th>
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</thead>
<tbody>
<tr>
<td>An injury that has originated during or as a result of sports activities.</td>
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<tr>
<td>An injury that interrupts sports practice.</td>
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<tr>
<td>An injury, which is caused by a sudden event during sports participation or which originates gradually as a result of sports participation.</td>
</tr>
<tr>
<td>An injury, which originates during physical education and sports practice during ‘working’ time is also considered a sports injury.</td>
</tr>
<tr>
<td>An injury that originates during watching sports events is not considered a sports injury.</td>
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Further, Olsen et al. (2005) defined the terms crucial for the description of sport injury. According to the authors, Reportable injury is an injury that occurred during a scheduled match or training session, causing the player to seek medical treatment or miss part of or the next match or training session. Return to participation depends upon the status of the player. The player was defined as injured until he or she was able to participate fully in club activities (match and training sessions).

Also, Fuller et al. (2006) in their monumental work on sport injuries defined injury as, “any physical complaint sustained by a player that results from a match or training, irrespective of the need for medical attention or time loss from sporting activities.” An injury that results in a player receiving medical attention is referred as a “medical attention” injury, and an injury that results in a player being unable to take full part in future training or match play is referred as a “time loss” injury. Athletic injuries occur primarily to bones, muscles, tendons, ligaments, joints, and skin. Recurrent injury: A recurrent injury is defined as an injury of the same type and at the same site as an index injury which occurs after a player’s return to full participation from the index injury. A recurrent injury occurring within two months of a player’s return to full participation is referred to as an “early recurrence,” one occurring 2–12
months after a player’s return to full participation as a “late recurrence,” and the one occurring more than 12 months after a player’s return to full participation as a “delayed recurrence.” Injury severity: Injury severity is defined as the number of days that have elapsed from the date of injury to the date of player’s return to full participation in team training and availability for match selection. The day on which an injury occurs is day zero and is not counted when determining the severity of an injury.

Match exposure: Match exposure is defined as play between teams from different clubs. Training exposure: Training exposure is defined as team based and individual physical activity under the control or guidance of the team’s coaching or fitness staff aimed at maintaining or improving players’ sporting skills or physical condition (as cited in Fuller et al., 2006).

**EPIDEMIOLOGICAL PERSPECTIVE OF SPORT INJURIES**

For sport scientists and clinicians to obtain better understanding of the magnitude of risk associated with sport, it is critical to gather data that illustrate injury epidemiology. In contrast, the research also indicates that the sport and recreation related injuries are often considered anecdotally to be less intense as compared to other types of injuries occurring unintentionally, seeking treatment at emergency department (Bedford & Macauley, 1984). Undoubtedly, the beneficial effects of regular physical activity are uncontested, as the literature suggests that the health economy based cost benefits observed from studies based in USA, Austria and Switzerland show that sedentary people incur greater cost of illness i.e., approximately 30-50% more than physically active individuals (Pratt et al., 2000). These complications need to be adequately understood if they are to be minimized. Definitely, the physical activity is a potentially powerful tool to fight against “obesity” epidemic and improvement of public health worldwide (Tremblay & Williams, 2003).

As the rate of regular physical activity is increasing, there is potential increase in the number of injuries. Therefore, it is imperative to consider the benefits associated with participation in sport with respect to increased preponderance for physical risks (Stevenson et al., 2003). Injury is a major threat for professional athletes and also for those who are returning to competition post injury with greater perceived risk (Fuller & Walker, 2006).
The following researches have tried to dwell upon the magnitude of the sport injury related concerns:

The rising trend in the participation of sport worldwide is leading to an increased injury rate both in organized games and athletic meetings as well as in recreational activities (Milenovic & Milic, 1980). The type, kind and level of sport may have forbearance on the injury intensity and frequency. As reported by Bergandi (1985) there are approximately 750,000 sport injuries annually at college and secondary level athletics. According to Green and Weinberg (2001), approximately 3.3 million sport injuries require emergency treatment in hospitals as reported by the National Safety Council for 1991 (as cited in National Safety Council, 1993) which includes injuries in varied sport like archery, baseball, racquetball, skate boarding and horseback riding.

The sport related injuries have a great impact on the social and economic factors internationally. Thus, the benefits for which sport and recreational activities are pursued must be considered in light of physical risks as well as economic burden (Hume & Marshall, 1994). Globally, injuries of all kinds of sport, account for a considerable burden on the economies, estimated to be around 12% of the market economies or even higher. The injuries not only have an impact on public health, but also cause considerable crunch to the financial sector almost similar to the cost of cancer and stroke (Murray & Lopez, 1996).

The figures mentioned in the literature appear to be relatively consistent for countries such as Canada, USA and UK as evident from the published data (Brewer, 2001). The empirical evidence suggests the seriousness of sport related injuries as depicted by the presentations in the emergency departments (Cassell et al., 2003; Conn et al., 2003).

The population based studies conducted in different countries corroborate similar patterns:

Australia: From the population based study in Perth, Western Australia, the authors estimated the prevalence of sport injuries in winter sport season in the year 1997 (for five months) and found that out of 92% participants who met inclusion criteria, about 51% sustained one or the other form of injury. The study reported that incidence of injury was greatest in the first four weeks of the season and players
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between 26-30 years had approximately 55% greater risk of injury than those aged less than 18 years. The research study also reported that in Australia 1 athlete in 17 per year is injured sufficiently while playing game for which game/training is missed, player leaves the field or seeks medical/first aid attention. Out of all, three quarters of the injuries occurred in eight popular sport: Australian football, rugby league, rugby union, soccer, netball, basketball, field hockey and cricket, it has been estimated that sport injuries cost around one billion Australian dollars a year to Australian community (Stevenson et al., 2000). In congruence with this, the authors (Stevenson et al., 2003) reported that the average cost of sport injuries per season for participants was AUD $126 per injured player. This accounts to enormous sum of AUD $ 4.85 million per season for Western Australia. Further, the incidence of injury was high in contact sport such as Australian football (20/1000 hrs) and baseball (15/1000 hrs) and lowest in netball (12/1000 hrs). The study also revealed that male participants were significantly more prone to injury (19/1000 hrs) in comparison to females (13/1000 hrs). Among the different age groups, the incidence of injury was high in 26-30 years age group (20/1000 hrs). The research shows that sport injuries lead to economic burden also as it was observed that expenditure mooted out to meet the stresses placed by sport related injuries in Australia was estimated to be around $1.8 billion per annum (Medibank, 2004). Similarly, in the population based study conducted in Victoria, Australia, it was observed that the rate of serious injury related to sport/recreation was 1.8 serious cases, and 0.6 deaths per 100,000 participants annually. The findings also revealed that there is excessive risk of serious injury for motor, power, boat, equestrian, aero sport and Australian football (Gabbe et al., 2005).

Finland: The study based in Finland reported less injuries, i.e., one acute injury per 17 adults per year as seen in sport in comparison to the data from other countries (Sandelin et al., 1984).

Germany: In another research study based in Germany, the authors surveyed the prevalence of sport injuries during the period October, 1997 to March, 1999. It was reported that in a net sample of 7124 people aged between 18-79 years, 3.1% of Germans sustained sport injuries previous year, corresponding to an annual injury rate of 5.6% among those engaged in regular physical activity. The study ranked sport
injuries as the second most common type of accidents and also reported that about 62% of all sport injuries result in time taken off work (Schneider et al., 2006).

Netherlands: The epidemiological survey in the Netherlands reported approximately 2.7 million ‘physical’ injuries in sport annually, i.e., six out of ten participants annually (van Galen & Diedericks, 1988). In another population based study, the researchers have estimated the lifetime health care costs of injuries occurring in Netherlands in the year 1999 and found that total health care costs due to injury were 3.7% (€ 1.15 billion) of the total health care budget out of which 10% accounts for sport injuries. This figure of 3.7% accounted to total health care budget which was almost favorably equal to the total health care budget of 10% in the US and 8% in Australia (Meerding et al., 2006). According to Sytema et al. (2010), there are nearly 1.5 million sport injuries which occur annually in Netherlands and approximately half of the injuries require medical assistance. In another population based study, it was reported that in the Netherlands, over 46% of its 16 million people participate in sport activities at an organized or non-organized level. The National survey showed that 3.5 million new sport injuries occur each year in Netherlands out of which 75% patients experienced acute origin and 58% were involved in organized sport (Baarveld et al., 2011).

New Zealand: In a population based study in New Zealand conducted on 6-15 years old children playing rugby union, rugby league and netball, in 258 games over a period of four weeks, it was reported that out of 5174 players, an injury rate of 18 per 1000 player hours was observed. Seventy five minor and moderate injuries were observed across all sport. The study also informed that the rate of adult injuries within these sport were highest in New Zealand with considerable management cost (Pringle et al., 1998).

United Kingdom: Even as early as 1979, the authors reported that research studies carried out at Leeds, Southampton and Glasgow showed that out of 60,000 people in Glasgow attending casualty department, more than 3500 cases were due to sport injuries which was higher than road traffic accidents (Davies, 1981). In United Kingdom, it was reported that participation in sport had great impact on economy with over £ 237 million per year, for an injury incidence of over 4 million. Along with this, the additional cost of treating these injuries was approximately over £ 184 million in which the major chunk was consumed by physiotherapy services (Nicholl...
et al., 1993). The literature also reports an estimate of 9.8 million new substantive injury episodes from vigorous sport and recreational pursuits in the age group of 16-45 years in England and Wales per annum. Exercise related morbidity was found to be a potential public health issue that reduces the benefit gained from exercise in young and fit population. The authors reported that economically, the costs and benefits of exercise in UK and Netherlands, in younger population, revealed that cost outweighs the benefits (Nicholl et al., 1995).

United States: Similarly, it was also reported that in US, during 1997 and 1998, there were approximately 3.7 million sport related emergency department visits annually, which represents 11% of all injury related emergency department visits. The medical charges for the visits estimated to be around $ 500 million annually (Burt & Overpeck, 2001; Ni et al., 2002). It was observed that around 7 million Americans received medical facilities/attention for sport and recreational related injuries, i.e., 25.9 injury episodes per 1000 population (Conn et al., 2003). Also, in another study conducted for one year duration (July, 2000 to June, 2001) over 4.2 million non-fatal sport and recreational related injuries were treated in the U.S. emergency departments and of these over 95,000 (2.3%) required hospitalization. It was also reported in another population based study that in Wisconsin, USA in 2000, around 1714 sport and recreation related injuries required hospitalization (i.e., 32.0 per 100,000 population) (Dempsey et al., 2005).

The beneficial and positive effects of sport on physical and mental health are undisputed. But, it is also true that the unwanted side effects of sport in the form of sport injury which theoretically are avoidable and also controllable through the proper implementation of preventive measures. So, in order to weigh the positive and negative effects of sport, it is imperative to study and know injury epidemiology (Schneider et al., 2006).

The replete amount of research mentioned above has pointed towards the seriousness of the risk associated with the participation in sport. The efforts aimed at prevention and reduction of injuries together with promotion of participation in physical activity/sport is critical. Thus, it is important to describe patterns and causes of sport injury, factors influencing the occurrence, prevention of sport injury, relationship between injury and potential adverse outcomes, rehabilitation of sport injury as well as factors influencing rehabilitation in detail.
SPORT INJURY CLASSIFICATION

The severity of sport injuries could be described on the basis of six criteria: the nature of the sport injury, the duration and nature of the treatment, sporting time lost, working time lost, permanent damage and monetary costs (van Mechelen, 1997).

Injury classification: According to Olsen et al. (2005), Type of injury includes acute and overuse injuries. Acute injury has a sudden onset and is associated with a known trauma whereas Overuse injury has a gradual onset without any known trauma. Severity of injury is categorized into slight, minor, moderate and major types. Slight—0 days of absence and able to participate fully in the next match or training session; Minor—absence from match or training for 1-7 days; Moderate—absence from match or training for 8-21 days; and Major—absence from match or training for >21 days.

Sport injuries can also be classified according to anatomical location, with six categories: lower limbs (LL; injuries produced anywhere between the most distal part of the toes and the lower edge of the inguinal and gluteal folds), upper limbs (UL; injuries produced between the most distal part of the fingers and the lower edge of the axillary folds), trunk (injuries produced between the inferior edge of the supraclavicular hollow and the superior edge of the inguinal and gluteal folds, laterally limited by the superior axillary folds), neck (injuries produced between the superior edge of the supraclavicular hollow and an imaginary line joining the point of the chin and the occipital point), the skull (injuries produced above that imaginary line), and polyinjury when more than one of the above categories is affected (Chamorro et al., 2009).

Sport injuries with respect to the type of injuries, can be classified into eight subcategories: visceral (injuries to internal chest or abdominal tissue or intracranial injury), fractures (open or closed and all the associated sub-lesions), dislocations (considered as loss of anatomic joint integrity and all the associated sub-lesions except fractures), wounds (broken skin, with or without deeper layer involvement), tendon disorders (acute or chronic inflammation, partial or complete rupture), ligament disorders (painful, sensitive to palpation and/or physical examination), muscular (encompassing muscle tear, contracture and late-onset muscle pain), and contusion (impact without evidence of osteo-muscular repercussion) (Chamorro et al., 2009).
According to Brukner and Khan (2008) the sport injuries can be classified as:

1. Acute injuries
2. Overuse injuries

1. Acute injuries: The acute injuries may occur due to extrinsic and intrinsic causes. Extrinsic causes include direct blow or contact with player or equipment and intrinsic causes include injury to muscle and ligament. The acute injuries can further be classified depending on site injured (bone, cartilage, joint, muscle, ligament, tendon, bursa, nerve or skin) and on the type of injury (fracture, dislocation, sprain and strain). These injuries occur because of trauma so these are also termed as traumatic injuries.

Injury categorization on Site and Type of injury:

(i) Injury to Bone: The injuries of bone can be fractures (may be due to direct or indirect trauma) or periosteal injury (for example, hip pointer, i.e., injury to periosteum of iliac crest caused by direct blow).

(ii) Injury to Articular Cartilage: The articular cartilage is present at the end of long bones; it helps in absorbing shock and allows friction free movement. There are three types of articular cartilage injuries: (i) Disruption of articular cartilage, with or without damage to subchondral bone; (ii) Disruption of articular cartilage only; (iii) Disruption of articular cartilage and subchondral bone.

(iii) Injury to Joint: This occurs in the form of dislocation (complete dissociation of joint surfaces) or subluxation (partial contact).

(iv) Injury to Ligament: The main function of ligament is to increase the stability of a joint. Injury to the ligament is termed as ligament sprain. There are three grades of sprain: Grade I sprain–fibers are stretched but there is normal range of motion of stretched ligament; Grade II sprain–considerable number of fibers are stretched, joint is stretched and ligaments show increased laxity till a definite point; and Grade III sprain–there is complete tear of the ligament.

(v) Injury to Muscle: Injury to the muscle can be in the form of muscle strain (tear of muscle fibers), contusion (due to direct blow causing local muscle damage and bleeding) and cramps (involuntary muscle contractions that occur suddenly and can be debilitating). The factors which predispose an athlete to muscle strain are: inadequate warm up, insufficient joint range of motion, excessive muscle tightness, fatigue, overuse of muscle or inadequate recovery, muscle imbalance,
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(previous injury, faulty technique or biomechanical dysfunction, and spinal dysfunction.

(vi) Injury to Tendon: Injuries to the tendon occur at the point of least blood supply.

Acute injuries can also take place in the form of injury to nerve (neuropathia, neurotmesis, axonotmesis) bursa or skin (abrasions, lacerations or puncture wounds).

2. Overuse injuries: These injuries are quite common in sport. Overuse injuries to bone can be seen in the form of stress fractures, bone strain (indication that a patient is moving towards a stress fracture), osteitis (it’s the impaction trauma or primary inflammation of bone), periostitis (abnormal histological appearance of perioskeletal collagen), and apophysitis (bony inflammation and separation may occur at the attachment of strong, large tendons to the growth areas). These injuries are also present in the form of injury to articular cartilage (as in osteoarthritis), injury to joint (synovitis and capsulitis) or injury to ligament. Overuse injury to muscle occurs in the form of focal tissue thickening or fibrosis (repetitive microtrauma caused by overuse damage of muscle fibers), chronic compartment syndrome, and muscle soreness. Tendon injuries are the most common overuse injuries seen in the form of tendinosis (mainly occurs after surgery due to collagen disarray and separation of fibers). There can be a possibility of tendinitis (inflammation of tendon), paratenonitis (which includes peritendinitis, tenosynovitis), tenovaginitis (involving double layer of the tendon) or there can be tendon tears.

Overuse injuries may involve bursa and result in bursitis, nerve injury (nerve entrapment syndromes) or to skin in form of skin blisters.

ETIOLOGY AND PATHOMECHANICS OF SPORT INJURIES

Causes of Sport Injuries: The mounting amount of literature suggest numerous factors leading to sport injuries. The causes of sport injuries include physical/biomechanical, extrinsic/intrinsic/environmental, and psychological factors.

1. Physical/Biomechanical Factors: The work of Kirkby (1995) provided a list of precipitating factors such as inadequate physical conditioning and warm-up procedures, faulty biomechanical techniques used by athletes, deficient sport equipment, poor quality protective apparel, dangerous sport surfaces and, illegal and aggressive physical contact from opponents which could lead to injury. According to Weinberg and Gould (2003), the physical factors that may predispose to injury are:
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muscle imbalances, high-speed collisions, overtraining and physical fatigue. Thus, poor biomechanics may also predispose an athlete to injury.

2. Extrinsic and Intrinsic Factors: The causes of sport injuries have also been identified under two broad categories of risk variables: extrinsic and intrinsic factors. The extrinsic factors include the type of sport played (with high-risk activities like motorcycle racing standing in contrast with safer pursuits like tennis), methods of training undertaken, typical environment in which the sport is played and the nature and amount of protective equipment used. The intrinsic risk factors include personal characteristics of the participants such as age, gender and possible abnormalities of physical maturation (Kujala, 2002).

External temperature and body temperature also act as predisposing factors for sport injuries in the form of heat illness, and cold illness. Heat illness is seen in players due to dehydration, exhaustion, and failure of thermoregulatory system of body. It includes heat collapse, heat cramp, heat exhaustion and heat stroke. Cold illness occurs when the body core temperature drops below 35 degrees. The athlete may become disoriented and may hallucinate. Gradual body re-warming is preferred over rapid re-heating. Rapid re-heating may lower the core temperature further due to return of cold venous blood from extremities to the core (Norris, 2007).

3. Psychological Factors: The psychological factors also contribute to the risk of acquiring an injury other than physical and environmental factors. One major factor which increases the susceptibility to injury is stress. The stress results in alterations in attention, physiology and behaviour which increase the susceptibility to injury (Roh & Perna, 2003).

CLINICAL SIGNS AND SYMPTOMS

Signs of traumatic injury include the following: sudden, severe pain, swelling, inability to place weight on affected lower limb, extreme tenderness in affected limb, inability to move a joint through its full range of motion, weakness in the affected limb depending upon extent of injury and visible dislocation or break of a bone. Signs of an overuse injury include: pain when performing an activity, a dull ache when at rest, and swelling (Brukner & Khan, 1993).
MECHANICS OF SPORT INJURY OCCURRENCE

The knowledge regarding how the injury has occurred is vital as it provides useful information concerning the patterns and factors leading to the risk for injury occurrence. Seering and colleagues proposed seven basic mechanisms of injury: (a) contact of impact, (b) dynamic overload, (c) overuse, (d) structural vulnerability, (e) inflexibility, (f) muscle imbalance, and (g) rapid growth (Seering et al., 1980).

The player may get injured due to collision with another athlete or an object, voluntary or involuntary infringement of rules of the game, certain maneuvers used in sport which may threaten the physical strength of an athlete, putting excessive biomechanical stresses on certain structures while performing any movement, hit by fast moving objects like ball, equipment failure, vehicular accidents, manipulation of physiology like fluid restriction, weight loss etc., use of banned substances, unattended existing pathology, and undesirable outcome of therapy. Along with all these factors, environmental factors like hot humid playing conditions or excessive cold climates also pose a risk (Reid, 1992). These mechanisms may occur singularly, as in acute tissue damage resulting from contact or collision, but more commonly they may occur in combination, especially as seen in the endurance athletes.

The understanding of the mechanism of the injury provides useful information in designing subject centered rehabilitation and conditioning protocols, as well as in suggesting behavioural modifications. If the sports medicine practitioner is not aware of the stemming cause, then this may lead to persistent pain-injury cycle (Leadbetter, 2001). Thus, the term “injury mechanism” describes: (a) vital aspects of the playing (sport) situation—that is, the situation described from a sports specific point of view; (b) athlete and opponent behaviour—that is, a qualitative description of the athletes’ action and interaction with the opponent; (c) gross biomechanical characteristics—that is, a description of whole body biomechanics; and (d) detailed biomechanical characteristics—that is, a description of joint/tissue biomechanics (Bahr & Krosshaug, 2005).

ANTECEDENTS OF SPORT INJURIES

The understanding of the causes which includes risk factors (as to why particular athlete may be at a risk of getting injured) and injury mechanisms (i.e., how the injury has occurred) is critical (Bahr & Krosshaug, 2005).
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There is a strong need to understand the multifactorial nature of injury causation. It seems that injury has occurred after a single inciting event, but from the background, it comes to the fore that it results from the complex interactions between the various risk factors. This can best be explained with the understanding of various theoretical frameworks.

There are different models which describe the sport injury causation:

1. Stress-Injury Model (Andersen & Williams, 1988)
2. Epidemiological Model (Meeuwisse, 1994)
3. Biomechanical Model (McIntosh, 2005)
4. Comprehensive Model (Bahr & Krosshaug, 2005)

1. Stress-Injury Model: Andersen and Williams (1988) proposed the original Stress-Injury Model. According to this model, athletes’ history of stressors (e.g., life event stress, daily hassles, past injury history); and personality characteristics (e.g., hardiness, locus of control, sense of coherence, competitive trait anxiety), interact or in isolation exacerbate the stress response. When such an athlete experiences stressful situation during practice or competition, the athlete will appraise the situation as more stressful and experiences more physiological activation and attentional disruptions than normal individuals. This will increase the severity of the resulting stress response which will further increase the injury vulnerability of individuals at risk. This model was further reframed by Andersen and Williams in the year 1999, when the authors examined the influence of life stress, social support and stress responsivity (e.g., peripheral narrowing during stress) on injury outcome. It was postulated that a low level of social support has an influence on stress response and along with life stress, it leads to greater peripheral narrowing and greater susceptibility of injury.

2. Epidemiological Model: According to Meeuwisse (1994) the injury is not only caused by a single provocative event but it results from the complex interaction between the internal and external risk factors. The internal factors like age, sex, and body composition predispose the athlete to injury and are thus termed as risk factors. The factors like floor friction, and shoe related issues are put under the category of external factors which further increase the athletes’ susceptibility to injury. The interaction between internal and external risk factors “prepares” the athlete for an injury to occur in a given situation. According to Meeuwisse, the inciting event is the
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final link in the chain that results in injury and is directly associated with the onset of injury. All these events are considered as necessary causes.

3. Biomechanical Model: According to McIntosh (2005), the injury results from a transfer of energy to the tissues. The relationship between the load and load tolerance determines the injury outcome of an event. The inciting event either results in a mechanical load in excess of that tolerated by the human tissue or reduces the tolerance level to a point at which a normal mechanical load cannot be tolerated. The model also provides insight into how load, load tolerance and eventually the injury risk can decrease because of changes in all these factors through interventions.

4. Comprehensive Model: This model by Bahr and Krosshaug (2005) provided a complete approach to the injury occurring mechanics. According to this model, intrinsic and extrinsic risk factors can affect load and load tolerance. Further, other than load and load tolerance the factors like behaviour, attitude, skills, training, equipment, coaching, competitors, environment; internal risk factors like age, sex, body size; and external risk factors like protective equipments, training, and surfaces, all influence load and load tolerance. The model posits that interactions occurring between different factors may result in injury occurrence, and if these interactions are properly addressed, the necessary prevention strategies may be formulated.

TISSUE RESPONSE TO PHYSICAL INJURY

Response of soft tissue to injury: Understanding of the pathophysiological processes with respect to time involved in soft tissue healing is important as it improves the therapists’ efficiency to structure a successful rehabilitation program.

Effect of injury on muscle: Following acute injury, there is muscle atrophy as a result of cellular response to pain, inflammation as well as immobilization. There is no direct relationship between pain intensity and amount of muscle inhibition but persistent pain leads to muscle weakness because of decreased neural inputs. Even the smallest amount of joint stiffness leads to reflex inhibition of surrounding muscles. The decrement in muscle strength is noticed even after small periods of immobilization. There are numerous ways of determining the deficits in muscle strength which includes: Manual muscle testing, Functional testing and Isokinetic testing.
**Introduction**

**Effect of injury on tendon:** The tendon has a tensile strength that measures 45 to 98 N per millimeter, but tendon begins to fail at 8% to 10% of strain. As a result of injury, i.e., failure, pain occurs and it is not clear whether inflammation precedes degeneration or is driven by gradual mechanical failure. Available evidence suggests that inflammation occurs after a tendon tear.

**Effect of injury on ligament:** Injury to the ligament is followed by hematoma and soft tissue inflammatory process. Complete recovery from injury may take more than one year, and the ultimate tensile strength may be reduced by 30% to 50%. This occurs due to differing qualities of scar and matrix in healing ligament (Brukner & Khan, 1993; Leadbetter, 2001).

**Pathophysiology of Injury and Stages of Healing**

**Physiology of healing:** The aim of the therapeutic program varies, depending on which soft tissue structures are involved. The primary consequence of muscle injuries is loss of strength, mobility, and potentially adverse aesthetic effects (e.g., rupture of the pectoralis major muscle in a body builder). Tendon injuries result in constant pain and loss of movement. The ligament injuries result in instability. Diagnosis and treatment is established by the nature of the structure injured, the competitive level of the athlete, and the specific sport. Establishing what the athlete can do and cannot do, as well as what the athlete wishes to do, helps in determining the extent of the diagnostic evaluation (Brukner & Khan, 1993; Leadbetter, 2001).

**Stages of healing:** There are three phases involved in the healing process. These are as follow:

1. **Acute Inflammatory Phase**
2. **Fibroplastic–Repair Phase**
3. **The Maturation–Remodeling Phase**

1. **Acute Inflammatory Phase:** This stage lasts for 2-4 days and the inflammatory response is clinically seen as redness, swelling, increased warmth and tenderness. Inflammation is the central feature of trauma. The initial treatment is focused on reducing the inflammatory response in order to decrease pain and to prevent further loss of function. The inflammatory response is the same, irrespective of location and nature of the injurious agent and consists of chemical, metabolic, permeability and vascular changes. The most common is the release of histamine which causes
increased capillary permeability and results in escape of fluid and blood cells into the interstitial spaces (Harrelson, 1998).

2. Fibroplastic–Repair Phase: This phase begins during the inflammatory response period and continues for next 4-6 weeks. In this phase, the fibrin clot is replaced with granulation tissue which is made up of collagen and fibroblasts.

3. The Maturation–Remodeling Phase: During this stage, the fibroblastic activity decreases and stress on the collagen fibers causes them to realign in parallel to the force applied. It takes months/years to bring back the strength of the injured tissue.

The treatment requires controlled mobilization during this stage to maximize the orientation of healing fibers (Brukner & Khan, 1993; Leadbetter, 2001).

FACTORS AFFECTING HEALING

According to Hippocrates (1955), healing is not only a matter of time but sometimes it’s also a matter of opportunity. Athletic injuries present an intriguing problem to the therapist. The circumstances at the time of injury, the risk taking behaviour, and the continued exposure to risk, make interesting characteristics of the injury in sport. In this respect, the clinical predictability of injury healing must always be qualified by the imposed demand. All connective tissues are not the same and the intrinsic differences which exist in the biologic nature of connective tissues have yet to be fully understood with regard to their impact on the quality of healing (Bowerman, 1977).

The soft tissue healing is affected by both the epigenetic and genetic factors. Epigenetic factors are those which influence the phenotypic expressions of the cell without affecting the genome, for example vascularity, hormonal influence etc. The genetic factors are those which are intrinsic to the individual. There are factors like age which has both epigenetic and genetic role in injury response (Leadbetter, 2001).

PRINCIPLES OF SPORT INJURY PREVENTION

One of the most important roles of physiotherapist or a sports medicine practitioner is to prevent or minimize injury related to any activity. The sport injury prevention is divided into three phases:

1. Primary prevention: it includes promotion of health and prevention of injury.
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2. Secondary prevention: it includes the early diagnosis and treatment to prevent the reoccurrence of injury and limit disability.

3. Tertiary prevention: it includes rehabilitating a patient and correcting the disability due to underlying disease.

Factors that assist in the prevention of injury: The various factors that assist in the prevention of sport injury are as follows: Warm up, stretching, taping and bracing, protective equipment, suitable equipment, appropriate surfaces, appropriate training, adequate recovery, psychology, and nutrition (Brukner & Khan, 2008).

DETERMINE THE SIGNIFICANCE OF SPORT TO ATHLETE

It is necessary to estimate the level of commitment an injured athlete has towards the sport. This may not be directed towards his expertise in sport but will help the management in decision making process regarding the athletes’ rest period. The athletes who are professional (full time) are in a position to devote more time to treatment and rehabilitation in comparison to athletes who are amateur and are working and doing job. Thus, it is necessary to know these long term and short term goals/commitments of athletes before framing the rehabilitation protocols (Brukner & Khan, 1993).

PAIN: BIOPSYCHOSOCIOLOGICAL PERSPECTIVE

Definition: According to French and Sim (2004), Pain has a component of ‘unpleasantness, suffering and negative affect.’ These constitute the central core of the whole experience of pain, rather than only a response to injury. Thus, pain is multidimensional construct in nature and should be treated considering social and psychological context also.

Multidimensional Construct: The most recent focus of interventions in the management of pain involves the application of treatments predicated on psychological research and theory. The focus on psychological management of pain has developed as a result of an increased understanding of pain as a complex phenomenon that takes place through an interaction of sensory-discriminative, motivational-affective, and cognitive-evaluative components (Melzack & Wall, 1965).

The construct of pain is multi-component, with only loose associations between structural damage, pain experience, disability, physical maintaining factors,
emotional factors and wider environmental and socioeconomic influences (Nachemson, 1992). This exerts the need to consider the multicomponent models while dealing with pain. The sport injury results in immediate tissue damage and necrosis triggering the pathobiological processes, which involves an acute inflammatory cascade, with resulting chemical nociceptor stimulation (Leadbetter, 2001).

Pain has sensory, affective, evaluative, cognitive and behavioural elements. The way in which athlete construct meaning around pain is influenced by numerous factors like personality traits, cultural resources, network of social support and the relationship between the athletes' understanding of their pain and that conveyed to them by therapist/health practitioner. Thus, an understanding of the sociological dimensions of pain should assist physiotherapists' awareness of the subjective experience of pain and the ways in which pain influence the individuals' life. This understanding will also provide insight into the beliefs that make up therapists' understanding of the nature of the pain, and how it differs from the athletes' assumptions of pain. Hence, understanding of the phenomenon of pain will potentially help the therapist in managing pain in a more sensitive, appropriate and effective manner (Sim & Smith, 2004).

SPORT INJURY FROM PSYCHOSOCIAL PERSPECTIVE

Sport injury is more than a discrete episode. An extensive body of information has developed in the past three decades undermining the need for identification of psychosocial variables associated with resilience to sport injury (Mohan, 1988, 1996a, 1996b; Mohan & Anand, 1987; Mohan et al., 1991). Sport injury has been identified as a potent source of stress (Brewer & Petrie, 1995) and numerous personal and situational factors have been associated with psychological responses to sport injury (Brewer, 1998).

Need For Psychological Rehabilitation: An Overview

Sport injury is a catastrophic event which leads to psychological, physiological and emotional responses. The literature shows that attention has not been paid to use of psychological interventions in sport injury rehabilitation because emotional responses are seen as obvious and normal and therefore are taken for granted; training and treatment in sports medicine are mechanistic and technical and
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thus psychosocial aspect is ignored; and athletes are often reluctant to admit their psychological distress (May & Sieb, 1987). The research on psychological consequences of athletic injury among high-level competitors revealed that injured athletes exhibited greater depression and anxiety, and lower self-esteem than control groups immediately following physical injury and at follow-up sessions (Leddy et al., 1994).

The psychological variables influence injury onset, duration, and recovery; hence “rehabilitation from sport injury involves not only physical, but psychological considerations as well.” The negative emotions experienced by an injured athlete have an impact on the athletes’ attitude towards and subsequent recovery from injury. The factors associated with emotional responses to injury include perceived quality of life, perception of health, locus of control, and strategies used to cope with the injury (Crossmar, 1997).

Ultimately, “psychological predispositions and consequences play a critical role in determining the ultimate impact and duration of injury” (Ahern & Lohr, 1997, p. 756). In a study conducted by Johnston and Carroll (2000) to investigate the differences between injured and uninjured athletes, it was found that injured athletes face greater negative affect, lower self-esteem, and higher levels of depression and anxiety.

The reactions to sport injury are to some extent distinctive and are based on subjects’ perception about loss in terms of recovery, play time, time off from game and career. The perception of this loss determines as well as has an impact on the psyche of an injured sportsperson and its intent may result into psychological reactions such as anxiety, depression, fear, and low self-esteem (Green & Weinberg, 2001).

PSYCHOLOGICAL CORRELATES: AN OVERVIEW

ANXIETY

Spielberger (1990) defined anxiety as, “a transitory state which consists of feelings of apprehension and tension and a heightened activity of the autonomic nervous system.” It was observed that few athletes’ perform best at low levels, few at moderate levels and few at higher levels of anxiety. Hence, the individualistic approach is required to determine the athletes’ level of anxiety and it’s forbearance on optimal performance (Spielberger, 1990).
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**Mechanism:** The manifestation of anxiety above desired levels can be detrimental to the performance. The major cause of increased levels of anxiety is the athletes’ negative thought cycle and self-defeating statements. These advance on to trigger the physical effects of anxiety. That’s why it is imperative to discuss with athlete, the past injury record and performance profile to determine where the athlete is on the anxiety spectrum (Elko & Blanc, 2001). The anxiety can be conceptualized in two manners: state anxiety and trait anxiety. The general feelings of anxiety are represented by trait anxiety whereas current feelings of anxiety are represented by state anxiety (Leddy et al., 1994).

**Mechanism operational between physical anxiety and exercise:** The role of exercise in the prevention and treatment of anxiety is appealing in terms of the health benefits. The exercise has anxiolytic effects as it helps the individual learn to cope with feelings of arousal. There are numerous propositions on how exercise reduces the anxiety but consensus is lacking (Buckworth & Dishman, 2002a).

**STRESS**

The term stress has beguiled many prominent researchers. According to Andersen and Williams (1988) stress-related model of sport injury, the stress response consists of both the cognitive and psychological/attentional components; and each of these components exerts reciprocal influences on each other.

The concept of stress is defined as a nonspecific response of the body to a stimulus or event (stressor). When an individual experiences a stressor, the stressor will result in a physiological response. This response can be observed through several different measures, such as, elevated heart rate, dilated pupils, increased blood pressure, and galvanic skin response (GSR: which measures the electrical conductivity of the skin that changes when an individual is aroused or stressed). In related literature, the term “stress” indicates this kind of physiological response. Stressors may vary in form and include extreme temperature, lighting, time, pressure, lack of sleep, and exposure to threat or danger, among others. However, the physiological responses produced within the body are similar irrespective of the nature of stressor (Selye, 1956).

In contrast, part of the physiological response to stressors is adaptive, that is, it prepares the body to function effectively under a challenging situation. For example, due to stress, there is increased heart rate and rise in blood pressure which is caused
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by the release of adrenaline and is intended to stimulate the central nervous system in preparation for performance. Thus, the stress response is often referred to as an adaptive one (Selye, 1993).

Mechanism: The demands caused by the sport itself, availability of resources to meet those demands and the lack of appropriate coping skills produce physiological tension and attentional deficits. When the perceived situation or threat is strong, then the stress response sets in and may increase the likelihood of acquiring an injury by disrupting the co-ordination and flexibility of the soft tissue structures and also interferes with the detection of important environmental cues (Nor, 2001).

The Underlying Properties of Athletes' Stressful Appraisals

According to Lazarus (2000), the appraisal of any situation as stressful depends upon the individual and his/her relationship with the environment. The work done by Lazarus and Folkman (1984) indicates that certain underlying properties exist which underpin the situations being perceived as stressful. Their study suggested that rather than probing the substantive issues of what a situation is about (e.g., pressure to win, need to be selected) one should focus on the underlying properties of situation that would lead to stress appraisals.

The authors identified eight underlying properties of stress and argued that for a situation that has personal significance or meaning to be appraised as stressful at least one of these eight properties must be present. These properties are: novelty, predictability, event uncertainty, imminence, duration, temporal uncertainty, ambiguity and timing in relation to the life cycle. If the situation is meaningful to the individual and does not exhibit any of the underlying properties of stress then it will not be appraised as stressful. Similarly, if a situation contains at least one underlying property of stress but holds no personal significance it will not be appraised as stressful (Lazarus & Folkman, 1984).

According to Thatcher and Day (2008), there are two new properties, i.e., Self and other Comparison, and Inadequate Preparation, which also determines the underlying properties of stress as experienced by the athlete. Self and Other Comparison reflects the centrality of performing better than an opponent in sport. In the sporting context, however, athletes had chosen to enter into the competition with the belief that they would attain the required skill level. When unable to achieve this skill level either because of poor performance in training or physical barriers such as
injury, this was labelled as poor preparation. In contrast to previously studied stress contexts, athletes felt that they were expected to be prepared and to perform well. Being unprepared for competition was therefore an underlying property of stress.

THE INTER-RELATIONSHIP AMONG ANXIETY, STRESS AND INJURY

Anxiety and stress are quite distressing expressions for an athlete. Both anxiety and stress produce high levels of physiological arousal which ensures the use of coping processes relevant to physiological-psychology so that these techniques are instrumental in decreasing levels of autonomic arousal. This helps in bringing the levels of physiological variables near to baseline (Mohan, 1997, 2001, 2013b; Mohan & Malhotra, 1973).

The physiological changes in response to stress were identified by Selye (1956) and were termed as General Adaptation Syndrome (GAS). It is a three stage model: Stage 1 is called Alarm stage with body’s flight or fight response getting activated against perceived threat. The hypothalamus sends the impulses to sympathetic branch of autonomic nervous system resulting in increased heart rate, respiratory rate and blood pressure, dilatation of pupils, release of glycogen and changes in the galvanic skin response (GSR). There is release of adrenaline and noradrenalin which further heightens the response implemented by the sympathetic system. Stage 2 is called as Resistance stage. If stressor is still present, then the sympathetic activity declines in intensity but constant level of readiness is maintained. Adrenaline level remains high which results in decrease in immunity. The long standing stress results in depletion of body’s reserves and resources along with diminution of immunity. Stage 3 is termed as Exhaustion stage. In this stage, body’s resources are depleted and blood glucose level drops. The immune system also gets depleted which may result in disease/psychosomatic illnesses.

Other than physiological symptoms, both anxiety and stress also leads to behavioural changes in an individual. Anxiety and stress may result in anger, aggressive behaviour in few, whereas depression in few others, which could be attributable to the influence or interaction of both the personal factors and environmental factors. The long standing anxiety leads to a state of stress, with characteristic physiological conditions, psychological causes and outcomes of impaired physical and psychological abilities (Staal, 2004).
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Stress as a Precursor to Sport Injury

There has been a considerable focus on the relationship between stress and the incidence of injury and much research has supported the Andersen and Williams (1988) stress and injury model which suggests that stress response may lead to increased injury risk.

Fletcher and colleagues (Fletcher et al., 2006), conceptualized the distinction between stressors and strain. According to them, stressors refer to the stimuli which could be any event, situation, condition or environmental demands faced by an individual and strain refers to individuals’ negative psychological, physical or behavioural reaction to stressors. Thus, the term stress should characterize the whole process including stressors, strains, appraisals, and coping responses and not just unitary components (Fletcher & Scott, 2010).

Injury as a Source of Stress

An injury or the fear of occurrence of an injury can be a source of stress experienced by an athlete (Ivleva & Orlick, 1991). The injured athletes commonly experience anger, frustration, depression, and concern about their future (Leddy et al., 1994).

Mechanism and role of exercise in stress response

When the human body is under threat, it initiates a set of neuroendocrine responses, including an increased secretion of glucocorticoids (GCs) and catecholamines from the adrenal gland and the activation of the sympathetic nervous system. These hormonal secretions allow a “fight or flight” response by mobilizing endogenous substrate and inducing a state of insulin resistance in the liver and skeletal muscles. This supports the assumption that the stress response is a neuroendocrine mechanism; then physical activity should be the natural means to prevent the consequences of stress. Indeed, the evidence documents the favorable effects of regular exercise in preventing and ameliorating the physiological and psychological comorbidities induced by stress. These benefits may occur from a central effect of exercise to reduce the sensitivity to stress and also the peripheral actions influencing the physiological variables like metabolic functions. Thus, regular exercise is a parsimonious means to prevent and fight this burden of stress (Tsatsoulis & Fountoulakis, 2006).
SOCIAL SUPPORT

The literature supports the increasing attention given to social support which plays an important role in athletic rehabilitation and coping from sport injury (e.g., Bianco, 2001; Podlog & Eklund, 2006; Tracey, 2003).

Social support has a parsimonious effect on the etiology of and recovery from both the physical illness and psychological distress. The benefits of altering behavioural and emotional features in treatment programs are equally intriguing. Thus, there is a need to adopt the broader definition of social support as, “the resources provided by other persons.” This is in sync with the World Health Organization definition of health which states that health refers to “physical, mental and social well being” (Cohen & Syme, 1985).

From the point of encountering a stressor (e.g., sport injury), to the process of experiencing stress imposed by the stressor and resultant psychological responses, at every stage, in this route, the social support has a paramount role to play. Further, according to the main effect model, mere presence of good social support has a favorable relationship to the psychological outcomes irrespective of levels of stressors (Cohen & Wills, 1985). The literature also shows another interesting perspective of injury, its related outcomes with regard to performance standards and social support availability. The influence of injury related stressors is greatest in the athletes for whom sport is a medium of socialization (Evans & Hardy, 1995), in whom sport is everything (Johnston & Carroll, 1998b), and those who associate themselves with sport (Green & Weinberg, 2001).

Podlog and Eklund (2007) recognized that level of sport participation influence the social support–injury relationship and it also affect the extent to which social support may moderate injured athletes’ appraisal of injury related stressors. Hence, sporting standards have important implications for the way in which these influence social support functions and its relationship with the psychological responses of the injured athletes.

Thus, the concept of social support refers to the difference between individuals in terms of their communication with the social environment. Social relationships, social integration and social network indexes are thought to be important: factors in individuals’ mental and physical health (House et al., 1988). Social support has a
significant impact on sport performance (Sarason et al., 1990) which is substantially supported by the performance related studies in tennis (Rees & Hardy, 2004), and in golf (Rees et al., 2007).

SELF-ESTEEM

The association of global self-esteem with psychological well being has been demonstrated in past research as evidenced from the literature indicating the inverse association between self-esteem and depression (Rosenberg, 1986; Wylie, 1979); strongly related to levels of anxiety (Luck & Heiss, 1972; Rosenberg, 1989); or in psychological manifestations (Luck & Heiss, 1972; Rosenberg, 1986). Wasley and Lox (1998) in their study on self-esteem and coping responses of athletes with acute versus chronic injuries suggested that the type of injury may determine differences in self-esteem and coping behaviour.

Despite of limited body of research on physical activity and self-esteem, the results are encouraging. The literature reveals that significant changes were found in self-esteem, physical self-worth and other components of physical self-perception after exercise training. These positive associations between exercise and self-esteem were stronger for individuals who were initially low in self-esteem (Buckworth & Dishman, 2002b).

Mechanism: The high levels of self-esteem are associated with good mental health in contrast to individuals with low levels of self-esteem. Self-esteem also exerts influence on behaviour. The self-esteem may act as a function of expectations regarding how the behavioural outcomes affect self-perception. Self-esteem is influenced by numerous factors, such as, physical body, sensory input, demographic characteristics, psychosocial dynamics and social and cultural environment (Buckworth & Dishman, 2002b).

SELF-EFFICACY

General self-efficacy explains the broad pattern of successful coping with life. It stresses upon the broad and stable sense of personal competence to deal effectively with a variety of stressful situations (Luszczyńska et al., 2005a). Numerous studies on the adoption of health practices have measured self-efficacy as a potential factor influencing the initiation of behaviour change. Self-efficacy act as a great personal
resource factor and thus influence and facilitate the coping skills of an individual (Knoll et al., 2005).

Mechanism: Self-efficacy beliefs are supposed to influence the individuals’ course of action, the effort required, endurance in the face of difficulties, the nature of the thought patterns and the related affective reactions (Bandura, 1977). Self-efficacy is task specific and can be applied to functional, social and academic tasks. The performance of an individual is predicted better by the individuals’ beliefs about him/herself and his/her capabilities than by what he/she is actually capable of accomplishing (Bandura, 1989).

The construct of self-efficacy is also comprised of other factors of importance. These factors which are important and constitute the construct of self-efficacy are thought to be the rehabilitation environment, as well as the experience and personal skills of doctors and therapists. These factors may be difficult to measure, but they may play an important role in rehabilitation in order to strengthen self-efficacy for physical tasks as observed in patients with an anterior cruciate ligament (ACL) injury (Thomeé et al., 2007).

OPTIMISM

Positive psychology has received renewed interest by researchers over the past decade and particular focus has been in the area of optimism. The vast body of research on measures of optimism has shown to predict diverse and important benefits for individuals’ positive mood, mastery-oriented achievement (Peterson, 1988), physical health and greater recovery from illness or surgery (Peterson, 1988; Scheier & Carver, 1987).

Mechanism: The conceptualization of optimism has been derived from a model of self-regulation which posits that directed behaviour is best predicted by outcome expectancies. The expectation that good will happen represents the characteristics of optimists (Scheier & Carver, 1985). It was observed that both optimism and pessimism relate to different patterns of preferred defense mechanisms (Dember et al., 1989). Almost recently, the construct of optimism and pessimism have been found to be associated with clinical and health psychology (Lewis et al., 1995). Mounting empirical evidence suggests the association between dispositional optimism and pessimism; and psychological and physical health consequences (Scheier et al., 2001).
FEAR AND AVOIDANCE BEHAVIOURS

The research shows that fear-avoidance beliefs, i.e., the avoidance behaviours have been associated with disability in patients with a variety of musculoskeletal pain conditions. According to Sterling et al. (2004), the psychological factors such as fear and anxiety affect measures of both pain threshold and tolerance. Additionally, in low back pain patients, changes in fear-avoidance beliefs also predicted changes in self-reported disability (George et al., 2006).

Mechanism: Fordyce (1976) applied learning theory to behavioural medicine, relating pain behaviour to operant conditioning. The emphasis was on positive reinforcement of pain behaviour. Subsequently, the consideration shifted to ‘avoidance-learning’, i.e., reduction of pain by avoidance behaviour resulting in negative reinforcement (Fordyce et al., 1982). It was noted that avoidance behaviour was based on anticipated consequences, so little reinforcement was required to maintain the behaviour.

Avoidance Behaviour

According to Philips (1987), “avoiding is the most prominent component of pain behaviour” (p. 274). When the avoidance behaviour persists even after the healing of the injured tissue, avoidance may be viewed as a maladaptive response that may contribute to disability (Bortz, 1984), physical deconditioning, dysphoric affect, and preoccupation with somatic symptoms (including persistent complaints of pain) (Asmundson et al., 1999).

Fordyce et al. (1982) described the role of operant conditioning in association with behaviours connected with persistent pain. According to this theorization, the individuals learn through experience that avoidance of situations and activities resulting in acute episodes of pain will reduce the likelihood of re-experiencing pain. Hence, reinforcing the avoidance behaviour, in the short-term, through the reduction of suffering associated with noception can, also, act as an adaptive response.

Fear of pain: Fear of pain (and of activities or events associated with pain) is a central construct in the cognitive-behavioural models. Based on these avoidance models, it was purported that cognitive, physiological, and behavioural responses to pain may, symbolize a phobic response that serves to maintain pain behaviour (McCracken et al., 1992).
Fear of physical activity and work: Along with the construct of fear of pain, Waddell et al. (1993) studied the relationship between chronic back pain, disability, pain-related fear and avoidance beliefs about physical and work-related activities. The findings showed that pain-related fear-avoidance beliefs about work are the most specific and powerful factors accounting for disability and work loss associated with chronic low back pain. It was suggested that these beliefs were established to be stronger predictors of disability than were the biomedical measures of pain (e.g., anatomical pattern of pain, time pattern of pain, severity of pain). It further provided empirical evidence to the importance of fear and avoidance in the persistence of pain behaviour and related disability.

Kinesiophobia

The construct of kinesiophobia (i.e., fear of physical activity stemming from the belief that it will lead to pain, injury, or reinjury) is also consistent with the fear and avoidance related research findings (Crombez, 1994). The empirical evidence espouse that individuals’ with persistent musculoskeletal pain fear a variety of situations that are not necessarily associated with pain. The findings reveal that fear of pain and fear of pain-related experiences and activities, combined with avoidance behaviour, may be more disabling than pain itself. Thus, the sound body of literature indicates that patients with persistent pain have a tendency to fear a variety of situations and stimuli that are not necessarily related to pain, but which may play a significant role in the development and maintenance of persistent pain behaviour (Asmundson et al., 1999).

AGGRESSION

The word aggression has come from the Latin word ‘aggressio’ meaning to attack (Panksepp & Zellner, 2004). The past literature shows that a lot of researchers have tried identifying the processes underlying such an unethical behaviour in sport (Kirker et al., 2000; Stephens, 2001). Today, aggression is possibly considered as one of the key difficulties to handle in sport (Sacks et al., 2003).

Holowchak (2003) distinguished between three models of aggression for better objectivity on construct of aggression: the strong-disposition models, culture pattern models and weak disposition models.
According to strong disposition models, “aggression is a force/impulse that builds up within each person and requires periodic release, so that it is not harmful to an individual.” But contemporary research indicates that aggression does not lead to catharsis but to more aggression. The cultural pattern models stress that aggression is primarily a learnt behaviour and the main basic unit is culture and not the individual but this model fails to explain the biophysiological links to aggression. The weak disposition models provide a better understanding of aggression which states that both the biological and the learning factors influence aggression. The research shows that the best approach to understand aggression is interdisciplinary which considers biological, behavioural and cognitive components. Other than understanding the basic concept, it is imperative to understand the role of other psychological correlates with respect to aggression. Relation was found between affective feelings (anger), cognition and temperament (impulsivity, hostility). Most of the classifications in the research indicate towards two kinds of aggression: Hostile aggression and Instrumental aggression. Hostile aggression refers to an act primarily oriented to hurt another individual whereas instrumental aggression refers to as a means for solving problems or obtaining a variety of objectives (Ramirez & Andreu, 2006).

The research also divulge that athletes’ affinity for his sport may also lead to unethical aggressive behaviour, and this becomes more so prominent if this affinity is a reflection of self, making athlete react in a defensive manner to protect this self (Donahue et al., 2009).

THEORETICAL FRAMEWORK EXPLAINING THE PSYCHOLOGICAL APPRAISAL OF SPORT INJURY AND REHABILITATION

The psychological appraisal of sport injury and rehabilitation process could be explained thoroughly with the help of theoretical frameworks in the form of theories and models as mentioned below:

1. Protection Motivation Theory: Early work done by the researchers on this theory postulates that there are two cognitive processes which are implicated in the decision to adopt protective health behaviours (or, alternatively, produce a maladaptive response): the threat appraisal process and the coping appraisal process (Maddux & Rogers, 1983).
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The threat appraisal process involves the awareness of the severity of a potentially harmful situation (e.g., patients’ perception of how severe the threat to their health is) and a perceived vulnerability or susceptibility to harm (e.g., how susceptible patients are to the health threat). The coping appraisal process deals with the perception of how likely a particular course of action reduces or prevents the threat (labelled response efficacy; e.g., how effective will the patients’ response be), and a perception of how likely one can perform particular actions (labelled self-efficacy; e.g., patients’ perceptions of their abilities to follow the recommended rehabilitation program). Both the threat appraisal and coping appraisal combine to form patients’ protection motivation, which could direct behavioural responses including explicit behaviour (e.g., complete rehabilitation) and inhibition of actions (e.g., avoiding exercises that increase the risk of re-injury) (Prentice-Dunn & Rogers, 1986). Quite recently, it was Taylor and May (1996) who actually determined the usefulness of protection motivation theory in predicting adherence to sport injury rehabilitation. The presence of cause and effect relationship between protection motivation theory and adherence rehabilitation might add to the use of appropriate interventions in order to increase adherence to rehabilitation protocols (Christakou & Lavallee, 2009).

2. Personal Investment Theory: According to Maehr and Braskamp (1986), personal investment theory proposed that motivation in specific situations is determined by personal incentives, sense of self-belief and perceived options. The personal incentives refer to an individual’s subjective goals for involvement in a particular activity, such as, task incentives, ego incentives, social incentives and extrinsic incentives. Sense of self-belief refers to an individual’s thoughts and feelings regarding their existence (i.e., the individual’s perceptions of competence and self-reliance, one’s tendency to behave in accordance with personal goals, one’s sense of relationship with significant others), and perceived options (the perceived alternative behaviours) that can decide motivation in specific situations.

Thus, to conclude, the personal investment theory posits that the denotation of the injury rehabilitation process is largely determined by the individual characteristics and situational factors. Hence, the meaning of the injury rehabilitation process can influence whether the athlete will choose to adhere to a rehabilitation program or not (Christakou & Lavallee, 2009).
3. Cognitive Appraisal Models: There are numerous cognitive appraisal models which elucidate athletes’ reactions to sport injuries (e.g., Grove, 1993; Wiese-Bjornstal et al., 1998). These models describe injury as a stressor or a stimulus, and the response of the individual is dependent upon a variety of factors that influence the interpretation of this stimulus. The most comprehensive of these is the integrated model proposed by Wiese-Bjornstal et al. (1998) which describes the complex relationship of psychological, situational and cognitive variables to emotional and behavioural responses of sport injury. According to this model, there are pre-injury and post-injury factors which determine how an athlete reacts to a sport injury. Pre-injury factors are personality, history of stressors, coping resources and interventions. Post-injury factors include personal factors (e.g., type and severity of the injury, general health status, demographic variables) and situational factors (e.g., sport played, social support system, accessibility to rehabilitation). These factors integrate to determine the cognitive appraisal of the injury, which in turn affects the emotional and behavioural responses to injury, and, eventually, the rehabilitation outcome.

4. Biopsychosocial Model: The biopsychosocial model is developed by Brewer et al. (2002). This model incorporates biological, social, medical and psychological factors. The model is comprised of seven interacting components: injury characteristics, sociodemographic factors, biological factors, psychological factors, social/contextual factors, intermediate biopsychological outcomes and sport injury rehabilitation outcomes.

According to this model, the sport injury rehabilitation process commences with the occurrence of an injury. The specific characteristics of the injury (e.g., type, course, severity, location and history of injury) and sociodemographic factors (e.g., age, gender, race/ethnicity, and socioeconomic status) exert influence on the biological factors (e.g., nutrition, sleep), psychological factors (e.g., personality, cognition) and social/contextual factors (e.g., social networks, life stress). The biological, psychological and social/contextual factors influence intermediate biopsychological outcomes (e.g., strength, rate of recovery); also the psychological factors are being reciprocally affected by these outcomes. The final component of the model is the sport injury rehabilitation outcomes encompassing functional performance, quality of life, treatment satisfaction and readiness to return to sport.
This phase of the model is also reciprocally related to both the intermediate biopsychological outcomes and the psychological factors.

The benefit of this model is that it fits well within the performance oriented sport culture which relies on the explicit recognition of the parsimonious integration of physiological, psychological and social factors which influence sport performance.

Junge (2000) also stressed upon the need to consider the interlinks between various factors as well as the athletes’ response to those situations in causing injury. The significant impact of psychosocial stressors leading to injury as well as reaction of athlete towards these stressors, along with the coping resources and emotional states related to specific situations also influence the susceptibility to injury. These psychological factors are dependent on each other. This is represented in the Figure 1A.

Figure 1A. Model of the Influence of Psychological Factors on Sports Injury


Thus, it is clearly depicted in Figure 1A that psychosocial factors affect the occurrence and severity of injury.
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PSYCHOLOGICAL RESPONSES TO SPORT INJURY (as cited in Brewer & Cornelius, 2003)

It is vital for the therapist to understand and acknowledge the profound potential and disorganized dynamics following sport injury which are affected by nature, course and severity of the injury (Mohan, 2002a, 2002b, 2003a, 2003b, 2012).

The responses can be broadly categorized into two components: emotional responses and behavioural responses as mentioned below:

Emotional Responses to Sport Injury: Emotional responses refer to affective (i.e., feeling) states that are experienced by an athlete post injury onset. The athlete perceives the injury as a loss of an aspect of the self, hence, supposed to exhibit reactions similar to an individual who has experienced a serious psychological loss (Rotella & Heyman, 1986). The extensive research on this aspect has been done by Kubler-Ross who developed stage models of grief and loss which postulated that an individual experiences a sequence of emotional responses to the loss, leading to eventual adaptation. According to this model, in response to a major loss, an individual goes through five stages: denial, anger, bargaining, depression and acceptance (Kubler-Ross, 1969).

During different stages: The literature shows that an injured athlete experiences a range of emotions subsequently after the injury onset. In the initial stage following an injury, there is preponderance of negative emotions such as depression, frustration, confusion, anger and fear (Gordon & Lindgren, 1990; Shelley & Carroll, 1996). During the middle phase of rehabilitation, the emotions concerning the injury shifts to rehabilitation-related issues, and so, the depression and frustration are commonly reported emotions in this stage. As rehabilitation of the injury nears completion, depression and frustration remains prevalent along with the emergence of another emotion as the athlete is preparing for a comeback, i.e., a fear of re-injury (Johnston & Carroll, 1998a).

Severity: According to Heil (1993b), the emotional disturbances experienced by an athlete are not of a sufficient magnitude or duration to be assigned a clinical diagnosis. But the literature on epidemiological studies have shown that a sizeable number of injured athletes (5–24%) face emotional disturbances which are clinically significant as determined by scores on psychometric instruments, or through, clinical
interviews (Brewer & Petrie, 1995) and risk of suicide is also observed in injured athletes who experience severe levels of post-injury emotional distress, particularly depression (Smith & Milliner, 1994). The athletes who are most likely to encounter difficulty adjusting emotionally to injury are those who are young, least hardy, most strongly identified with the athlete role, dispositionally anxious, most invested in having a career as a professional athlete, most experienced in the rigors of sport injury rehabilitation, and most pessimistic (Wiese-Bjornstal et al., 1998).

Age: Meyers et al. (1991) found a curvilinear relationship between the age and emotional disturbance for participants recovering from knee surgery. It was suggested that participants of intermediate age (20–39 years) reported greater levels of emotional disturbance than younger (10–19 years) and older (40–49 years) participants.

Thus, to conclude, the cognitive appraisals such as confidence in oneself, one’s body and one’s recovery are associated with more positive emotional states following sport injury.

**Behavioural Responses to Sport Injury:** In addition to emotional reactions, an injured athlete experiences a multitude of behavioural responses post injury. Behavioural responses refer to overt actions that are manifested following the occurrence of injury, which could best be explained under two subheadings: coping behaviours and adherence behaviours.

**Coping behaviours:** This construct is of paramount importance as the coping attitudes’ determine the rehabilitation outcomes. Athletes may engage in certain behaviours to help them cope with the situation such as, an aggressive rehabilitation approach, avoiding others, building strength, distracting oneself (e.g., keeping busy, seeking a change of scenery), driving through (e.g., doing things normally, learning about their injuries, resting when tired, working hard to achieve rehabilitation goals), seeking out and using social support networks, trying alternative treatments, and working or training at their own pace (Gould et al., 1997).

**Adherence behaviours:** The ultimate factor which is of great significance during rehabilitation is the adherence to rehabilitation protocols for favorable outcomes. The recommended rehabilitation protocol is a culmination of number of different behaviours, including: (i) performing clinic based activities, such as doing exercises
designed to increase strength, flexibility and endurance; (ii) modifying physical activity, such as resting and limiting activity; (iii) taking medications; and (iv) completing home-based activities, such as cryotherapy and home rehabilitation exercises (Brewer, 1998). The literature pertaining to research on adherence behaviours have identified personal, situational and cognitive factors to be associated with sport injury rehabilitation adherence (Wiese-Bjornstal et al., 1998).

**Personal factors**: This includes both positive and negative factors which influence adherence post sport injury. The personal factors that share a positive relationship with sport injury rehabilitation adherence include: (i) an internal health locus of control which refers to the extent to which a person believes that health outcomes are under his own control (Laubach et al., 1996); (ii) pain tolerance (Fields et al., 1995); (iii) self-motivation (Fields et al., 1995); (iv) task involvement, which is the degree to which a person is motivated to improve against his own personal standards (Duda et al., 1989); (v) tough mindedness (Wittig & Schurr, 1994); and (vi) goal setting.

Personal factors that are negatively associated with adherence to sport injury rehabilitation are: (i) a chance health locus of control which refers to the extent to which a person believes that health outcomes are influenced by chance or luck; (ii) ego involvement which is the degree to which a person is motivated by comparisons with other individuals (Duda et al., 1989); and (iii) trait anxiety.

The self-motivation is one personal factor which is most consistently linked to adherence, and for this particular variable, almost all research studies identified a positive correlation between self-motivation and rehabilitation adherence (Duda et al., 1989). The other personal factors that influence rehabilitation adherence include, cognitive appraisal of ability to cope with injury; emotional adjustment (Taylor & May, 1996); importance or value of rehabilitation to the athlete; perceived susceptibility to further complications without rehabilitation; and rehabilitation self-efficacy (Udry, 1997).

**NATURE OF THE PROGRAM ADHERENCE**

The statistics in the literature show that approximately 40-65% of the patients or clients drop out from a number of medical related domains (Ice, 1985); whereas in another study it was reported that 64% of the patients comply with the short term physiotherapy exercise programs whereas only 23% adhere to the long term programs (Sluijs et al., 1993).
Adhering to the treatment is therefore a function of the qualities that an injured athlete possesses and the conditions surrounding the rehabilitation set-up (Fisher, 1990). According to Meichenbaum and Turk (1987) there are more than 200 variables that affect adherence. These variables can be categorized into three major factors: athletes’ personality characteristic, rehabilitation setting characteristics, and sports medicine practitioner-athlete interactions.

**CHALLENGES FACED BY THE INJURED ATHLETE IN ADHERING TO REHABILITATION**

A commitment towards the prescribed rehabilitation regimen is required for achieving successful outcome but rendering this high commitment to the task becomes difficult when there is worry about the injury. The challenges faced by the injured athlete can be categorized into: Cognitive, Affective, and Behavioural challenges (Pedersen, 1986).

1. **Cognitive challenges:** This includes the competing thoughts faced by the injured athlete like thoughts related to the understanding of the nature of the injury, understanding of the planned rehabilitation regimen and prognosis for recovery.

2. **Affective challenges:** This includes the post injury disruptive emotional responses faced by an athlete which puts rehabilitation in jeopardy. An injured athlete may have limited mood disturbance and is able to handle adverse situation in comparison to those who show elevated depression, anxiety, anger, denial and hopelessness. These emotional responses depend upon a number of factors such as severity/perception of severity of injury, time in the season/career and absence from the sport scene (Evans & Hardy, 1995).

3. **Behavioural challenges:** Adherence to injury rehabilitation program is more a motivational issue than only a physiological one. An injured athlete is not always completely ready to begin rehabilitation and also requires high commitment to deal with the possible ramifications. Pain becomes a critical issue to deal with as it can become overwhelming, demand immediate attention, disrupt ongoing plans and motivate athletes to behaviour aimed at stopping the pain as quickly as possible (Melzack, 1980). Thus, an injured athlete may have less optimistic thoughts and feelings, so the key to rehabilitation adherence requires injured athletes’ commitment to the program and ability of the sports medicine practitioner to enhance that commitment.
SPORT INJURY REHABILITATION: OVERALL PERSPECTIVE

Athletes’ perspective: The athlete suffers from severe psychological and physiological ramifications owing to injury. Due to stress and strain of acute injury, the athlete may be unable to cope up with the events following injury and may require assistance to come in terms with the sudden change in his status and abilities as well as to reassess and reframe his immediate and long term goals. An injured athlete may initially experience intrusive state which is painful but later on may be able to manage this level of intrusive flooding and shift towards avoidance stage. The oscillations between the intrusive and avoidance stage decreases slowly with time but this depends upon the individual coping mechanisms which then may influence the commencement of pathologic response to trauma (Horowitz et al., 1980; Zilberg et al., 1982). Further, the athlete has to cope up with the thoughts regarding the injury which may act as painful reminder of an event. In chronically injured athletes’ denial seems to be the most prevalent factor and athlete may try to minimize the severity of the injury and deny its long term sequelae. All this leads towards the route to acknowledge the significance of psychological rehabilitation to address the serious effects of injury (Shuer & Dietrich, 1997). The delay in the expeditious care can adversely affect an optimal outcome and return to sport performance in the shortest possible time.

Rehabilitation specialists’ perspective: The physicians, physiotherapists and sport trainers are the first ones to treat injured athlete, thus, the athlete seeks medical assistance from these personnel. For these injury rehabilitation personnel, the primary goal is to ‘return the injured athlete to competition as safely and quickly as possible. The ultimate goal of a comprehensive psychosocial program for sport injury management is to enhance the recovery process, successful return to sport by facilitating requisite psychological, behavioural and sociological recovery and growth maintaining equilibrium among these correlates. This will help mobilize and strengthen the existing coping skills and instill psychological readiness to complement physical readiness (Christakou & Lavallee, 2009).

REHABILITATION: TOWARDS A PARTICIPATORY APPROACH

Rehabilitation is one of the most challenging fields of sports medicine following athletic injury. According to Brukner and Khan (1993), rehabilitation may
be defined as, “the restoration to a former capacity or standing, or to rank, rights and privileges lost or forfeited.” As per Harrelson and Leaver-Dunn (1998), rehabilitation or reconditioning, is “a dynamic program of prescribed exercise for preventing or reversing the deleterious effects of inactivity while returning an individual to his or her former level of competition” (p.175).

There is a need for skillful rehabilitation as each athlete’s skill and post-injury goals are different. Because of individual differences in the psyche, the therapist must take into cognizance the psychological effects associated with injury throughout the rehabilitation period. The main approach for injury rehabilitation is based on physiological principles, guided by individual’s response which enables the athlete not only recovery from injury but also to prevent re-injury, and to maximize the restorative effect and minimize the maladaptive responses (Brukner & Khan, 1993).

**Principles of Sport Injury Rehabilitation:** The main principles which guide the sport injury rehabilitation process as adduced by Harrelson and Leaver-Dunn (1998) are:

1. To decrease damage/inflammation/pain.
2. To promote healing.
3. To maintain and increase range of motion (ROM).
4. To prevent atrophy.
5. To regain pre-injury level of muscular strength, power and endurance.
6. To return to complete asymptomatic pre-injury level of functional activities.
7. To facilitate functional recovery.
8. To avoid maladaptive responses.

Brukner and Khan (1993) ascribed that if the athletic rehabilitation is inappropriate, it will predispose the athlete to the following conditions: re-injury of the affected area, incapable of performing at pre-injury standard, and predisposing an injury to another part. Thus, the essential keys for the successful implementation of the rehabilitation program includes: give proper explanation to athlete, to provide precise exercise prescription, make the most of the facilities available to them, and to begin injury rehabilitation as soon as possible. Considering the principles guiding the athletic rehabilitation, the process of rehabilitation can be divided into two major components: physical rehabilitation and psychological rehabilitation.
PHYSICAL REHABILITATION

Principles of Management

Rehabilitation is one of the most challenging areas to deal with, following the athletic injury. The ultimate goal of any rehabilitation protocol is to enable the athlete return to its optimal pre-injury status and also to develop a preventive maintenance program in order to reduce the chances of injury recurrence. Rehabilitation is challenging because every athlete is different with unique characteristics, and therefore, each athlete’s response to injury is also unique. Also, different sport and different playing position place specific demands and characteristics which also put different stresses on the body. Physical therapy is defined as the treatment of disease, injury or disability by physical and mechanical means using massage, regulated exercise, water, light, heat and electricity (Brukner & Khan, 2008).

Stages of Rehabilitation: In response to injury, specific physiologic events occur and it is the role of clinician to reduce the severity of these physiologic events, optimize the healing time and make the athlete return to competition as early as possible. There are three stages of athletic rehabilitation:

**Initial stage:** This stage is also called as Acute stage and lasts from first 48 to 72 hours. The main focus of this stage is to limit the inflammation and control pain by the R.I.C.E. method, i.e., Rest, Ice, Compression and Elevation. This stage is considered to be from the time of injury to almost full pain free range of motion. During this stage, massage to reduce pain and swelling, flexibility, mobilization and gentle range of motion (ROM) exercises are started. Isometric exercises, resistance and agility exercises are gradually integrated. Proprioception exercises are started once the patient is allowed to bear the weight. Hydrotherapy to limit excessive weight bearing to lower limbs and for general cardiovascular endurance may be advised.

**Intermediate stage:** This stage is also called as Subacute or Recovery stage and lasts from three days to few weeks. The main focus in this stage is the restoration of joint range, flexibility of soft-tissue structures, strength, endurance and proprioception. It is generally the longest stage. This stage implies that patient has returned to activities of daily living (ADL’s) and has good range of motion (ROM) and strength throughout that range. In this stage strengthening exercises are progressed. For this, the resistance and number of repetitions are increased as per the individual need to increase strength.
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The athlete should start with isotonic exercises and progress to more functional close kinetic chain exercises (like leg press, squat and climbing stairs), and medicinal ball exercises. The sport specific activities can also be undertaken at this stage. Some treatment modalities like massage therapy, passive joint mobilization, electrotherapeutic modalities and hydrotherapy may be used as a precursor to exercise.

Advanced stage: This stage is also called as Functional rehabilitation stage and lasts from weeks to months. The focus of this stage is to improve neuromuscular control, sport specific activities, and multi-plane activities. To reach at this stage, patient must have good strength and endurance with full flexibility and ROM. Proprioceptive exercises, balance beam, minitrampoline, throwing activities are performed without any adverse effect. Muscle conditioning should be specific to the required activity and athlete is gradually prepared for return to sport by progressing through a sequence of functional activities required for sport. During this stage, the athlete should be able to work between 70–90% of the normal training load. The injured athlete may be apprehensive about performing the activity that caused injury and may have fear associated with injury recurrence. These fears should subside with the support from the therapist and the well-structured rehabilitation program (Brukner & Khan, 2008).

Assessment and Intensive Treatment: The ultimate principle of injury management is to address the treatment through the problem-solving approach. The main components of this approach as given by Brukner and Khan (1993) includes:

1. Evaluation: It is important to obtain a detailed and subjective history of the injured athlete at the first place. This is followed by objective evaluation which includes observation, inspection and palpation.
2. Assessment of range of motion and muscle performance, neurovascular testing along with functional and sport-specific testing.
3. Identify the specific problems.
4. To make diagnosis after necessary investigations.
5. To initiate plan of care.
6. Periodic re-evaluations and re-assessments.

Components of Rehabilitation: The essential components of athletic rehabilitation as recognized by Brukner and Khan (1993) are as follow: Muscle conditioning,
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Flexibility, Neuromuscular control, Functional exercises, Sport skills, Correction of abnormal biomechanics, Maintenance of cardiovascular fitness, and Psychology.

Use of physical modalities: This includes cryotherapy, superficial heat, contrast bath and use of electrotherapeutic modalities like ultrasound, transcutaneous electrical nerve stimulation (TENS), iontophoresis, interferential therapy (IFT), high voltage galvanic stimulation (HVGS), neuromuscular stimulation, Light amplification by stimulated emission of radiation (LASER) and diathermy to relieve the pain and accelerate healing process. The guiding principle governing their use is to minimize the injury and time away from sport.

Manual therapy: It is a broad group of treatment consisting of Joint mobilization, manipulation and traction; Muscle energy techniques and massage therapy; and Neural stretching. The judicious use of these techniques help relieve pain and restore pain-free full range of motion.

Therapeutic exercises: The rehabilitative therapeutic exercises include isometric, isokinetic and isotonic kind of exercises. These exercises help to regain performance attributes such as strength, endurance, power and agility.

Adjunct therapies: These therapies can also be used or advocated along with the main treatment to enhance the healing process. This includes acupuncture, dry needling, hyperbaric oxygen and extracorporeal shock wave therapy.

Thus, for the optimal treatment, a thorough and comprehensive evaluation is necessary which depends upon the detailed and careful history taking, knowledge of anatomy, kinesiology, applied biomechanics, traumatology, observation and a thorough physical examination. The mainstay of the treatment is to achieve pain free full range of motion, normal flexibility, strength, power, endurance, balance, co-ordination, accuracy and timing in order to return to pre-injury status without activity restriction. This can be achieved through therapeutic exercises, therapeutic modalities, patient education and a structured rehabilitation program tailored to meet the individual needs. Despite of numerous advancements in conservative management, surgery may be the option both in case of acute and overuse injuries which are not showing signs of recovery through conservative management (Brukner & Khan, 2008; Courson, 1998).
Progression of rehabilitation: The progression of the athletic rehabilitation program can be achieved by manipulating the various parameters of the athletic activity. Brukner and Khan (1993) listed the parameters on which the progression of athletes’ return to a sport is possible. These are as follow: type of activity, duration of activity, frequency of activity/rest, intensity of activity, and complexity of activity.

Monitoring the rehabilitation program: The therapist should monitor the patients’ progression both objectively and subjectively to assess the efficacy of the rehabilitation program and to see any negative effects. The following variables need to be monitored such as: pain, tenderness, range of motion, swelling, heat, redness, and ability to perform exercises and functional activities. If any undesirable effect is found, the program should be either reduced or continued at same level, depending upon the severity of the adverse effect (Brukner & Khan, 1993).

Failure to respond to treatment: The various factors which may affect the responsiveness to treatment are: incorrect diagnosis, improper/incorrect/inadequate treatment, failure of athlete to follow treatment schedule, undue pressure from coach and parents, and poor and ineffective communication. So, in order to increase the treatment responsiveness, it is necessary to establish goals as well as to reassess the athlete at regular intervals (Reid, 1992).

RETURN TO SPORT FOLLOWING INJURY

The return to sport is considered to be the final step towards complete rehabilitation. It is vital that the athlete should not stop the rehabilitation program as soon as he returns to sport because rehabilitation continues even after the time of return to play. In counseling return to activity, it is the pattern of pain that dictates success. Participation is usually restricted or prohibited if the athlete has any complaint of pain on daily activities. Pain should be assessed for intensity, duration, and length of recovery time needed after activity. Guidelines for return to sport activity should be provided to the athlete to allow a safe progressive return to competition. In addition, the objective standards of strength, endurance, power, agility, speed, and ROM must be assessed both manually as well as mechanically in order to provide a comparative record of performance. Functional testing (e.g., jumping, sprinting, carioca drills, sport-imitative skill exercises) should be assessed as it provides a base to counsel the athlete on readiness for competition. The signs of increasing pain or physical findings such as swelling or warmth should be viewed
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with caution as such signs signal initiation of readjustment of the training schedule. Ultimately, the athlete should be allowed to participate in competition after all clinical symptoms and biomechanical deficits have resolved and are no longer causing subclinical maladaptations (Brukner & Khan, 1993; Dugan & Frontera, 2006).

**Relative contraindications to return to sport:** The relative contraindications to return to sport are following: persistent recurrent swelling, joint instability, loss of joint range of motion, and lack of full muscle strength (Brukner & Khan, 1993).

**FACTORS AFFECTING ATHLETIC REHABILITATION**

According to Brukner and Khan (1993), the main physical and psychological factors which affect the athletic rehabilitation are:

1. The type of injury
2. Circumstances of injury
3. Pressure from external sources (e.g., fear of losing position in the team)
4. Pain tolerance
5. Psychological attributes of the player

**PSYCHOLOGICAL REHABILITATION**

A voluminous body of research reveals that numerous interventions have been investigated experimentally for their effects on physical and psychological rehabilitation outcomes (Mohan & Mall, 1985; Mohan & Thakkar, 1989; Mohan & Kamlesh, 1993; Mohan & Sehgal, 2004) such as goal setting (Theodorakis et al., 1996); stress inoculation training (Ross & Berger, 1996); biofeedback (Ahern & Lohr, 1997; Levitt et al., 1995); self-talk (Theodorakis et al., 1997); imagery/relaxation (Cupal & Brewer, 2001); and a multimodal intervention consisting of goal setting, imagery, relaxation and stress management (Johnson, 2000). There is a need to tap the mental faculties of injured athletes’ for optimal recovery (Mohan, 2013a).

**PSYCHOLOGICAL ASSESSMENT OF SPORT INJURY**

According to Heil (1993c), the psychological assessment of injury during different phases is as follows: **Factors Preceding Injury:** It includes medical history, psychological history, somatization, life stress and change, sport stress and change, approach to major competition, marginal player status, overtraining and sport-related
health risk factors. **Factors Associated with Injury:** It includes emotional distress, injury site, pain, timeliness, and unexpectedness. **Factors Following Injury:** It includes compliance with treatment, perceived effectiveness, treatment complications, pain, medication use, psychological status, social support, personality conflicts, fans and the media, and litigation.

Harrelson (1998) described that the process of injury occurrence and rehabilitation follows a cyclic path as shown in Figure 1B.

**Figure 1B. Cycle of Athletic Injury**


**PSYCHOPHYSIOLOGICAL PERSPECTIVE OF REHABILITATION**

In **Injury Prevention:** Adequate psychological arousal is required for optimal performance. If the athlete is over aroused, the muscle tension increases which disturb the agonist to antagonist muscle relationship which may lead to changes in the natural
technique of a player. All this lead to recruitment of abnormal motor patterns, a feeling of “loss of rhythm,” intake of suboptimal nutrition, high basal metabolic rate, and loss of concentration. These factors not only impair the sport performance but also predispose the athlete to injury. In case of under aroused athletes, there will be problems like inadequate warm ups, slow reaction time and lack of focus. This may also lead to injury (Brukner & Khan, 2008).

In Injury Rehabilitation: During the rehabilitation process, the injured athlete has a tendency to focus on the injury rather than on the elements of the treatment like functional exercises, sport specific drills, etc. This happens because the focus of injured athlete narrows down due to pain and fear associated with the injury consequences, and may predispose the athlete to injury recurrence. This result in a feedback loop which develops between the attention of an athlete and the injury itself which hinders the healing process. An injured player may face pressure from team mates, miss important competitive events, and lose position in the team with risk of financial losses. These pressures may result into high levels of frustration in an athlete. At this stage, those athletes who possess good coping skills, high self-esteem, and good concentration would be able to handle these external pressures and frustration with a positive outlook and focus mainly on the rehabilitation tasks. But players who lack good coping skills need help from the therapist, coach and other members of the rehabilitation team. The therapist should help the player in identifying the problematic areas, understand the injury process and make him comfortable (Brukner & Khan, 1993).

In recovery: The psychological factors play a vital role in aiding recovery, post injury. When there is insufficient psycho-physiological recovery, the athlete is sympathetically aroused which is observed in the form of increased resting heart rate, muscle fatigue and sleep disorder; delayed absorption of nutrients from gastrointestinal tract and increased metabolic rate. With time, when sympathetic system gets exhausted, athlete develops bradycardia, and decreased work capacity. This particular psychological state is similar to depression (Brukner & Khan, 1993).

INTERVENTIONS TO ENHANCE SPORT INJURY REHABILITATION ADHERENCE AND OUTCOMES

The tasks performed without much effort is determined by the athletes’ psychological skills. As training of technique increases motor skills, appropriate
psychological training can improve the consistency of an athletes’ on field performance. It is important to understand the term Adherence to sport rehabilitation which means, “the degree of an injured athlete’s compliance to a sports medicine/injury professional’s (i.e., physiotherapist, physician, sport trainer) instructions on participation in a rehabilitation program” (Christakou & Lavallee, 2009). Thus, the literature provides empirical evidence that psychological interventions which have been successfully used in sport injury rehabilitation are cognitive-behavioural in nature, and engage athletes in learning new skills or behaviours to cope more effectively with the rehabilitation process, both physically and psychologically.

The fundamental components which are requisite for an effective psychosocial management program for sport injury rehabilitation are as follows: (as cited in: Christakou & Lavallee, 2009)

1. **Education and awareness:** The foremost initial step in the rehabilitation process is to educate the injured athlete about the prevalent circumstances as a result of the injury. It is imperative to educate the athlete about the nature of injury, goals of prescribed treatment and prognosis for recovery in order to make him better understand the injury process as well as impact of injury on personal goals. Sport rehabilitation practitioner should provide information regarding the rehabilitation methods, reasons for doing specific exercises, likelihood of pain, effort needed to fully rehabilitate, and to increase the athletes’ commitment to the rehabilitation program. If an athlete faces emotional turmoil post injury, there is need to explain that it is normal to have these feelings, encourage expressing those concerns, and provide assistance to reappraise the injury so that the emotional response is less extreme. This will optimize adherence by helping athlete gain a clear and accurate insight into the injury rehabilitation process (Christakou & Lavallee, 2009).

2. **Engaging in communication and listening to the injured athlete:** One of the ways to enhance rehabilitation adherence is maintenance of effective communication between sport injury rehabilitation personnel and the athlete. Active listening without making judgments is an important step in building rapport with an athlete. It is necessary to carefully listen to the perception of an injured athlete regarding the severity of injury as well the concern about the re-injury. This therapeutic alliance between the sport injury rehabilitation personnel and injured athlete is of paramount
importance as athlete is able to interpret the experiences post injury so that injury is not treated as a threat to the athletes’ career. The core element in this therapeutic alliance is to provide a safe, non-judgmental environment where the athlete feels understood and is able to convey his concerns without compromising with the self-esteem (Christakou & Lavallee, 2009).

3. **Social support:** The process of rehabilitating a sport injury is essentially a social process involving the participation of family, friends, coach and other members of sports medicine team. The basic essence of social support lies in listening, encouraging and caring and through these components, social support helps to increase the adherence to sport rehabilitation (Fisher, 1999).

Social support is a multidimensional concept which has an impact on cognitive, emotional and behavioural responses to sport injury because of interlinks between social support and personal factors. There are numerous ways through which an injured athlete can be provided the desired social support in the sporting context, so that he still feels himself as an important member of the team. For this, an athlete may be encouraged to visit a sporting field and watch a match, or to place the athlete in contact with successfully rehabilitated athletes, especially those who have had similar injuries to discuss the difficulties and success in rehabilitation (Gordon et al., 1991). Another method is to rehabilitate the athlete in the sport complex itself by transporting the equipment to the practice area for on-site rehabilitation (Christakou & Lavallee, 2009).

4. **Positive Self-talk:** The positive self-talk is one of the cognitive restructuring interventions aimed at altering the athletes’ thoughts and, ultimately, feelings and behaviours, regarding their rehabilitation (Theodorakis et al., 1997). It helps the athlete to focus and attain optimal arousal level thereby replacing the negative thoughts with positive thoughts.

**Thought stoppage process:** An athlete might consider the injury as a threat to his well being. The simple technique is to make an athlete understand that he is experiencing negative thoughts which could affect his performance, so it is imperative to put a ‘Stop’ on these negative thoughts (Gieck, 1990). This is then followed by use of positive statements like, ‘I am going to complete the recovery process, I am improving, I am going to return to sport,’ ‘I want to return to play again this season,’
‘This injury is just a minor threat to my career in sport’ etc., so that athlete is able to counteract the negative thoughts by positive ones and thus influence rehabilitation in a positive manner (Christakou & Lavallee, 2009).

5. To augment athletes’ self beliefs: The compliance of an injured athlete with the rehabilitation program is to a great extent governed by the beliefs of an athlete regarding the injury and rehabilitation process. For enhancement of compliance, an athlete should have a positive outlook about the injury, rehabilitation process and have perseverance to complete the rehabilitation regimen (Fisher, 1999).

6. Goal-Setting: The setting of goals help the athlete approach the rehabilitation process with a task oriented outlook defining a set of skills required to be mastered, and at the same time identification of possible barriers pertaining to those set goals (Heil, 1993a). There is a need to establish both short term and long term goals to augment rehabilitation process.

Using short-term goals: The research reveals that the technique of goal setting has been used in sport to improve performance, perceptions of success and self-efficacy (Filby et al., 1999) and has also been recommended for use in injury rehabilitation (Evans & Hardy, 2002). Definitely, the goals should be realistic, achievable, bringing in the positive expectations and beliefs regarding the aims to be achieved by increasing the motivation and finally adherence to the rehabilitation program (Fisher, 1999). An athlete should not set too many goals early in the rehabilitation period, because if these goals are not met, it can have a detrimental effect on motivation. The examples of specific short-term goals may include, 5° increase in knee flexion by the end of the week, standing on balance board for 30 seconds, etc. Practitioners can monitor the goal oriented progress and also encourage the athletes to use the present tense in their discussions about rehabilitation (e.g., “What are the aims of my rehabilitation program this week?” or “What rehabilitation exercises do I have to follow today?”) (Christakou & Lavallee, 2009).

Using long-term goals: The significance of setting and achieving long-term goals also has a pivotal role in rehabilitation adherence. It includes idealized notions about how skillful athletes could ultimately become in their sport. The long-term goals should also be encouraged for future sport activity such as, ‘I want to reach my full fitness level by May’ or ‘In order to get back to the field in May, I have to put 100%
of my effort in doing my rehabilitation exercises’ (Christakou & Lavallee, 2009). Statements such as: “I want to be good at it. I think I can jump a lot higher than what I already have. The body may not let me continue but while I believe I can jump higher, I’m not going to give up,” epitomize this sentiment (Levy et al., 2006).

7. To enhance the capacity for pain tolerance: The variable of pain tolerance, which is a personal attribute, is positively related to rehabilitation adherence as it is considered that it may interact with situational factors in order to influence cognitive, emotional and behavioural responses to sport injury. If practitioner explains the athlete about the nature of pain he might encounter, then this prior information regarding the likelihood of pain increases the athletes’ tolerance to bear pain and hence the adherence to rehabilitation (Duda et al., 1989).

There are numerous techniques through which the pain tolerance can be enhanced. The therapist may advise deep-breathing techniques which help reduce athletes’ anxieties and fears associated with pain (Cousin & Philips, 1985); relaxation techniques such as progressive relaxation which increases comfort and reduce pain; and imagery, which has been found to be effective in reducing pain in medical and sport settings (Whitmarsh & Alderman, 1993). The other methods include both the dissociation and association strategies which can be used to lower and alter the athletes’ perceptions of pain, and through these techniques, the athlete is better able to cope with any discomfort. In Dissociation, the injured athletes’ attention can be directed away from the pain whereas, in Association, the athlete focuses directly on the specific locus of pain and tries to frame it (Christakou & Lavallee, 2009; Nideffer, 1983).

8. Motivation: The motivation is considered to be an essential component to enhance compliance of an injured athlete for rehabilitation program. There are numerous techniques which can increase motivation, such as, through goal setting. As a result of optimal motivation, the athletes can be directed to channelize their energies towards achievement of rehabilitation objectives, and a greater degree of control over their rehabilitation can be instilled (Wagman & Khelifa, 1996).

9. Routine: It helps to build consistency in sport performance and prepares the athlete mentally and physically for training and to optimize performance. This will help the player to enter into the optimal arousal zone. But these routines should be flexible so
10. Empathy: The empathy displayed by the rehabilitation specialist conveys a message of support and acceptance to the injured athlete. It makes the athlete feel understood and this serves as an essential element for effective treatment. The literature defines Empathy as the capability to see the world through the eyes of others, perception of their feelings, and skillfully listening to the said message as well as subtle shadings which even the patient may not be aware of (Cormier & Hackney, 1993).

In today’s social climate, excessive pressure and stress mounts on athletes. Thus, there is a strong need for the rehabilitation specialist to provide guidance and counseling responsibilities. It is imperative to recognize the potential benefits of using the athletes’ mind to prevent and manage injury. According to Shaffer and Wiese-Bjornstal (1999), the several techniques which use this integrated mind-body perspective for injury prevention and rehabilitation are as follows:

1. Pre-injury intervention strategies: This includes coping, relaxation, imagery, positive self-talk and stopping negative thoughts.

2. Post-injury intervention strategies: There is a need for the rehabilitation specialist to attend to the injured athlete as an individual, and not, just to the injury, to ensure success of the interventions post-injury (Petitpas & Danish, 1995). The success of the psychological intervention also depends upon how an injured athlete copes with the unstructured time, post injury. The strategies for increasing the recovery of injured athletes must follow the following practical recommendations: Maintain regular contact with injured athlete, point out the positive aspect of taking time out from the intensive sport training, reinforcing the athletes’ capacity to control and influence own rehabilitation, assist in setting rehabilitation goals, and encourage them to transfer mental skills they have learnt so as to ensure effective recovery (Ievleva & Orlick, 1991).

3. Philosophical intervention strategies: When the injured athlete is unwilling to comply with the medical advice and resist interventions, then the rehabilitation specialist must educate the injured athlete, coach and parents about the injury as
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well as the appropriate selection of responses and behaviours towards rehabilitation (as cited in Ray & Wiese-Bjornstal, 1999).

Steadman (2003) also gave a detailed psychological program for rehabilitation which includes complete understanding of the injury, the treatment, establishment of attainable goals at each stage in rehabilitation, prompt initiation of an aerobic program to help avoid the depression associated with the immediate post injury period, and psychological counseling, when necessary, to help the patient deal with his or her altered status as an athlete, especially during extended period of activity. Leonhardt et al. (2008) also stressed upon the need for facilitating effective communication for optimal recovery.

PSYCHOLOGICAL COUNSELING (as cited in Ray & Wiese-Bjornstal, 1999; Wagman & Khelifa, 1996)

Definition: There is no universally accepted definition of counseling and most of the time varied definitions revolve around, as to who is providing counseling, nature of problem, who is being counseled, level of training, use of techniques, ethical standards and rules of the professional associations of the counselors.

According to Ivey and Authier (1978) the most pervasive and vague definition of counseling is to help others. Further, Egan (1986) categorized the helpers according to their involvement into four categories:

1. First-level helpers (counselors, psychiatrists, psychologists, social workers)
2. Second-level helpers (consultants, health care professionals, lawyers, clergy, police, probation officers, teachers)
3. Third-level helpers (managers, supervisors, bartenders, hairdressers)
4. Fourth-level helpers (relatives, friends, acquaintances)

Thus, according to this definition, the medical care providers constitute the second-level helpers category who can counsel athletes and if need be, i.e., if there is some serious social-emotional problem, then they can refer the patient to the first-level helpers. But one definition which takes into cognizance the overall factors has been given by Biggs (1994) as “a helping process in which one person, a helper, facilitates exploration, understanding, and actions about developmental opportunities and problem conditions presented by a helpee or a client.” Counseling is defined as advice, guidance, and support and it is differentiated from psychotherapy or more
structured psychological interventions as these approaches require specific training, expertise, and a typical referral to clinical sport psychologist (Asken, 1999).

GUIDELINES WHILE DELIVERING COUNSELING

The administration of counseling follows precise guidelines. However, before implementing any psychological interventions, the athletic rehabilitation personnel should first establish rapport with the injured athlete in order to: (i) establish trust, (ii) become familiar with the patient's assessment/interpretation of what has occurred, and (iii) attempt to attain a commitment on the part of the patient. Consequently, the following steps are proposed:

Step 1 The foremost aim is to gain an understanding of the injured athletes’ psychological status. It is crucial to listen to what the athlete has to say.

Step 2 After identifying the various affective issues associated with the injured athlete, the focus shifts towards more in-depth identification, expression, and processing of those emotions that have surfaced in the athlete as a result of injury.

Step 3 The flow of communication is essential between rehabilitation specialist and injured athlete and it should be clear and easily understood by the athlete.

Step 4 After this, the primary focus of the consultation is on the teaching of general psychological skills to the injured athlete.

Step 5 Along with above mentioned steps it is essential to facilitate social and emotional support which can be achieved through the sport psychologist, the sports medicine team, family, coach, peers, or even in group sessions.

Step 6 An important consideration during return to the sport is whether the patient has the confidence necessary to return to practice and competition. The athletes experience anxiety and ask themselves, “Will I still be able to perform as I did before?” or “Will I be reinjured?” etc. Therefore, at this juncture, it is important for the athlete to be able to talk about thoughts and feelings about returning to competition with a rehabilitation practitioner. It becomes necessary to systematically assess the athletes’ level of readiness to return to sport. Thus, it is critical to alleviate any fears that may be lingering (Wagman & Khelifa, 1996).
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COMPONENTS OF COUNSELING

According to Ivey and Authier (1978) and Wiese-Bjornstal and Smith (1993), education or teaching constitutes an essential component of counseling in injured athletes. The second most essential component of counseling is to establish rapport and clear and effective communication with the injured athlete (Wiese & Weiss, 1987). The third component is to provide emotional first aid. As per Stewart (1989), counseling serves as an emotional first aid and the sports medicine practitioners are in an ideal position to provide counseling at an early stage than mental health practitioners because they spend more time with the athletes, often interacting with them on a daily basis.

COUNSELING ROLE OF THE PHYSICAL THERAPIST (as cited in Ray et al., 1999)

The physical therapist usually counsels the patients on certain aspects of their rehabilitation for injury or illness either in acute inpatient care or in clinically based outpatient facilities. According to American Physical Therapy Association (APTA), Guide for Professional Conduct (1991), the physical therapist must take into consideration the psychological welfare of their patients. According to APTA (1995), the physical therapists are required to incorporate the following components in their counseling practice:

1. Educating the patient regarding the proposed treatment plans.
2. Explaining the benefits and risks of the treatment plan.
3. Obtaining the informed consent from the patient before beginning the therapy.

In addition to this, a physical therapist must ensure the presence of following elements in their daily practice:

1. To deliver practice in a caring manner consistently.
2. To collaborate with patients, their families, and other individuals who seem to be responsible for the patient.
3. To interact with the patient for providing psychosocial support.
4. To establish effective communication with patient and their families.
5. To develop effective interpersonal relationships.
COUNSELING FOR IMPROVED REHABILITATION ADHERENCE (as cited in Fisher, 1999)

Adherence implies compliance with instructions and suggestions to achieve a goal. There is scant information available in the literature regarding the effectiveness of rehabilitation counseling with the injured athlete (Wiese-Bjornstal & Smith, 1993). Rehabilitation program adherence is a complex and multi-dimensional issue. The strategies should work towards increasing the self-confidence of the injured player. A combination of strategies and multi-treatment approaches are essential to counsel injured athletes. The various strategies are:

1. Competence Strategies: Injured athletes need to feel and understand that they can achieve their prescribed treatment goals successfully in spite of uncertainty and other negative emotions. This can be achieved through educating injured athletes about the injury and rehabilitation process, and encouraging positive beliefs and expectations to help enhance athletes’ competence.

2. Control Strategies: It is the ability or the perceived ability to control the significant aspect of a particular task. The treatment adherence is enhanced when the injured athletes’ sense that they can control the negative thoughts, emotions and actions that otherwise can alter their focus and intentions.

3. Commitment Strategies: It represents the willingness or the capability to persevere at a particular task until completion. The bottom line of treatment adherence is essentially a motivational issue which includes athletes’ persistence, perseverance and dedication towards rehabilitation program. The strategies that can foster commitment include social support, goal setting and a sensible use of threats versus challenges to enhance treatment adherence (Fisher, 1990).

ETHICAL CONCERNS IN COUNSELING

The most common type of ethical problems that directly involve the sports medicine professional includes breach of confidentiality, conflict of interest, exploitation and dependency. The sports medicine professional should prudently shoulder the ethical responsibilities by following the appropriate codes of ethics and learn to recognize and be sensitive towards the situation that presents ethical concerns (Loubert, 1999).
KEYS TO PROVIDE COUNSELING SERVICES

According to Flint (1999), the guidelines which help improve counseling are:

1. Develop a working relationship with the athlete and the coaching staff.
2. Keep lines of communication open.
3. Ensure confidentiality so that the injured athlete feels comfortable opening up.
4. Basic knowledge of the sport-specific nuances.
5. Understand the pressures on the athlete.
6. Flexibility regarding the timing and content of the counseling.

SPORT CHARACTERISTICS WHICH INFLUENCE COUNSELING

The sport characteristics such as the type of sport, level of play, social status attached with the sport and group, and the organizational relationships influencing the team, exert influence on the rehabilitation process. The external factors and the demands of sport may impose certain behavioural expectations and codes of conduct. Thus, rehabilitation specialist needs to tune to the nuances of each sport in order to integrate these subtleties into the counseling process (Flint, 1999).

DETERMINING FACTORS FOR PROVIDING PSYCHOSOCIAL INTERVENTIONS

The presence of one or more of these psychological difficulties should be an indication to the rehabilitation specialist that inculcation of sport psychological intervention is warranted: fear and anxiety present in patient, patient is depressed beyond what seems reasonable for the type of injury sustained, patient lacking a support system, course of rehabilitation and return to sport seems clouded, patient not recovering as expected, patient chooses not to adhere to the rehabilitation procedures, patient expresses a desire to return to practice before the sports medicine team gives their OK, patient lacks confidence that he/she will be able to recover fully, and patients’ self-worth seems “injured” as well (Wagman & Khelifa, 1996).

FACTORS THAT IMPEDE AN EFFECTIVE THERAPEUTIC RELATIONSHIP

(Smith, 1999)

It is essential to recognize the potential barriers for the successful working relationship which includes athletes’ circumstances, the sports medicine professionals’ circumstances and environmental circumstances.
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1. Athletes’ circumstances: The personality characteristics of an injured athlete and several other connected circumstances have the potential to make a therapeutic counseling relationship between athlete and sports medicine practitioner difficult. An injured athlete may have obsessive-compulsive disorder, exercise addiction, drug addiction, eating disorder or other psychological or psychiatric problems which may require a highly skilled clinical psychologist. Further, an injured athlete suspected of malingering for reasons such as rationalizing the loss of earlier status, offsetting realizations of insufficient ability, offsetting expectations of others, or attracting attention may affect the efforts of the rehabilitation specialist in promoting the optimal recovery and return to sport.

2. Sports medicine professionals’ circumstances: The impediment to the therapeutic counseling relationship occurs when the sports medicine practitioners face difficulty in maintaining the confidentiality or trust of the injured athlete or when there is no mutual respect, and it is unlikely that the therapeutic relationship will develop.

3. Environmental circumstances: It is essential to establish a conducive environment for effective counseling process (as cited in Ray & Wiese-Bjornstal, 1999).

INJURED ATHLETE AS A WHOLE: BIOPSYCHOSOCIAL DIMENSION

Sport injuries cause immediate imbalance and disruption to the lives of injured athletes including loss of health and decrement in achievement of athletic potential (Edouard et al., 2010). At times depending upon the severity, injuries also result in permanent disability or even death (Conn et al., 2003; Ni et al., 2002).

The empirical research purports that a comprehensive program is essential for optimal functional recovery post injury. The sport injury is considered to be of multifactorial nature, resulting in tissue damage. The injured athlete presents with clinical symptoms requiring different degrees of immobilization and rest at times. All this affects the performance faculty of the athlete as a whole. For that reason, injury should be viewed individualistically in the setting of an athlete, in order to obtain optimal functional recovery after injury. This perpetuates the need to consider sport injury as a multivariate psycho-biological phenomenon involving the injured athlete (Roi, 2010).

Thus, inclusion of the component that addresses the psychological recovery from a sport injury point of view in the conventional injury rehabilitation program...
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becomes critical in order to prevent and/or lessen the negative psychological consequences emanating from the injury, promoting early return to active involvement in sport-related activities. The research shows that numerous sport injury rehabilitation programs are beginning to integrate psychological interventions into the treatment regimens in order to expedite both physical and psychological recovery from injury (Mankad & Gordon, 2010; Mahoney & Hanrahan, 2011).

STATEMENT OF THE PROBLEM

Sport injuries cause interruption to sport training and competition. When athletes sustain injuries, the primary focus of sports medicine professional is understandably on the physical aspects of treatment and recovery. During the phase of injury, the athlete undergoes both physical and psychological deconditioning and even an elite athlete needs to cope up with this.

The extent to which the psychological interventions have been utilized along with physical rehabilitation of injured athletes, is largely unknown in India because of a hitherto deficient database. Quicker recovery from injury is paramount to the success in the field of sport. Several regimes are empirically used by the sportspersons to facilitate and hasten the recovery process. However, speculations have been expressed on the efficacy of psychological rehabilitation in the overall aspects of recovery, especially in terms of athletic injury rehabilitation and performance.

The physiotherapists and athletic trainers have a particular advantage in establishing psychosocial care relationships. The importance of the therapist-patient interaction is paramount in teaching self-management skills and providing support, empathy, reassurance and encouragement.

One such psychological strategy that fits into the demand of the program and is appropriate for clinical setting is psychological counseling. Thus, there exists a need to explore the possibility of using psychological counseling for enhancing the recovery process.

Considering the diverse treatment protocols and in the absence of single compact efficient program capsule for early recovery, the present study was designed to investigate the comparative efficacy of physical therapy and a combination of physical therapy and psychological counseling in rehabilitation of injured sportspersons.