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ORIGINAL

REHABILITATIVE STRATEGIES POST ACL RECONSTRUCTION: ACCELERATING RETURN TO PLAY

Aylin Yıldırım

Boğaziçi Üniversitesi, Sağlık Bilimleri Enstitüsü, İstanbul, Türkiye (Bogazici University, Institute of Health Sciences, Istanbul, Turkey).

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ABSTRACT

The consequences after the Anterior Cruciate Ligament reconstruction are not satisfied, and fewer or fewer people return to sports performance. The high ACL rate and knee re-injuries after return to play (RTP) are major apprehensions in young athletes after ACLR. Returning to sports after injuries is not easy; it's an intricate, multifactorial process that requires psychosocial approaches. Recent approaches demand optimized outcomes for patients and need optimized restoration strategies. However, there has been no restoration after ACLR and no sustainable efforts for a few years to elevate this process. One challenge seems to be the disconnection among researchers and patients due to limited evidence-based findings. Thus, there is a need for strong research to translate precautionary and restoration measures into practice. According to the research, rehabilitation sessions include the development of muscles, tendons, cartilage, and ligaments, and strength training is a crucial step. It is an important goal of physiotherapists to consider strength training while also considering the role of the neuromuscular system in the stabilization of joints. When the structure of players improves, they can move as per the sports requirements. Strength training to develop muscles includes 3 and 5 steps of 6-12 recurrences for each muscle group and each session. The intensity is 65- 85% for the maximum recurrence, and it is recommended to gradually go from low to high intensity and volume.

KEYWORDS: Rehabilitative Strategies (RS), Post ACL Reconstruction (ACL)

1. INTRODUCTION

The life of an athlete is quite different from that of a layman. So, the risk

of injury in athletes is higher than that of laymen. Thus, we can say the rehabilitation strategies for athletes must be quite different compared to rehabilitation strategies for the common man. In this introduction, we are going to discuss which type of rehabilitation strategies are adopted in Post ACL Reconstruction. The word ACL stands for anterior cruciate ligament, which is an important and strong ligament in the knee joint. During the performance, if any severe injury occurs to this ligament, surgery will be needed to align this ligament to its place back (Buckthorpe, 2019). This alignment and replacement is termed ACL Reconstruction. Only ACL Reconstruction is not quite enough but after this reconstruction, a few types of rehabilitation strategies are adopted to accelerate return to play for athletes. All these strategies aim to accelerate the rehabilitation process for Swift's recovery in the knee ligament. Post-rehabilitation strategies consist of a few phases, according to the state and condition of recovery in athletes (Van Grinsven, Van Cingel, Holla, & Van Loon, 2010). During the first phase of post-rehabilitation strategies, the important aspects considered are pain management, swelling reduction, different motion exercises, and quadriceps strengthening. A few painkillers are suggested to reduce pain in ligaments. Along with these painkillers, a few exercises are suggested to help reduce pain as well. To reduce inflammation during this phase, anti-inflammatory medicines are suggested (Buckthorpe, La Rosa, & Della Villa, 2019). Along with this, the animal-based diet is recommended because it helps to restore the original condition of the ligament of the knee. For proper alignment of ligament and quadriceps strengthening, a few motion exercises are suggested so that the ligament does not become stiff at a place. This phase lasts up to 2 weeks, depending upon the recovery rate in athletes. The next phase lasts 2 to 6 weeks, called the early strengthening phase. The main aspects of the early strengthening phase are resistance exercises, functional activities such as squats, balance training, and others (Ebert, Edwards, Joss, & Annear, 2022). In this phase, the ligament has reached such a condition that it can bear a little bit of stress in the form of force. During this process, the cell undergoes rapid growth to produce clusters of cells at the junction of the ligament to the bone. During this phase, rest is necessary, and a little bit of exercise is also mandatory to prevent ligament stiffness. The third phase of ACL Reconstruction is called the intermediate phase, which lasts 6 to 12 weeks after surgery (Myklebust & Bahr, 2005). The main aspects of the intermediate phase include agility drills, sport-specific exercises, and plyometric exercises. The agility drills involve cutting, pivoting, and other decelerating exercises that help improve the stability of joints. Plyometric exercises are the jumping exercises to increase the strength and endurance of athletes. In this way, the endurance capacity of joints also increases, which helps in better recovery of ligaments. The other sport-specific exercises are such activities of training related to a particular sport, such as need for strength in badminton, endurance and energy in cricket, and others (Waldron, Brown, Calderon, & Feldman, 2022). The fourth phase of ACL Reconstruction is an advanced phase

lasting 12 to 24 weeks. The main aspects of the advanced phase of ACL Reconstruction are high-strength exercises, power and speed exercises, different game scenarios, and others. Strength training is one of the most important exercises of post-ACL Reconstruction because this exercise is mainly aimed at providing strength to muscles. This exercise includes all of those movements that result in the strength of skeletal muscles, such as jumping, running, squats, hopping, and others. These strength exercises are mandatory to transform weak or injured Ligaments into normal conditions (Buckthorpe, Tamisari, & Della Villa, 2020). This exercise will give strength to the ligament. In some of the exercises of this phase, electrical stimulation is also involved. This means that electrical signals are usually used to activate and work a few muscles in the body. Therapeutic exercises are also common in which different body movements are suggested, which may result in more flexibility in joints. This will help in swift recovery in case of ACL. The most important aspect of ACL Reconstruction is Athletes' mental preparation and willingness. Medical science has proved that physical recovery depends on the athlete's mental health. Athletes' willingness to recover will result in such changes in the body that will accelerate the healing and recovery (Panariello, Stump, & Allen, 2017). In most cases, we have seen that the recovery and rehabilitation periods increase too much extent just because of poor mental health. So we should also pay attention to this aspect which affects athletes' physical health. To improve mental health, such an environment must be provided that can calm the athletes and reduce the depression or stress related to injury. The other training in the advanced phase is blood flow restriction Training, electromyography biofeedback, neuromuscular stimulation, cryotherapy, platelet-rich therapy, and others. The final phase of Post ACL Reconstruction is the Return to play phase, which starts after 24 weeks of surgery. In this period or phase, the continuous monitoring of the ligament is mandatory to prevent any other risk of Injury to the ligament (Flagg, Karavatas, Thompson Jr, & Bennett, 2019). In some cases, if the ligament does not heal fully, it can again give rise to injury or no healing of wounds. Sometimes, it has been seen that the rehabilitation period becomes too long in athletes as compared to layman, which is a negative point I respect to return to play. So, to reduce the rehabilitation period, there was a need for post-reconstruction strategies that could reduce the rehabilitation period and increase the chances of healing. Post-ACL Reconstruction is one of these post-surgery strategies. In recent times, science and technology have had tremendous success in each field of life, and this success has also spread to the field of sports. The Post ACL Reconstruction has been proven effective for increasing the chances of returning to play (Nyland et al., 2016).

1.1 Research Objective

The main objective of this research is to understand post-ACL Reconstruction Strategies. This study has effectively overviewed how post-ACL

Reconstruction has benefited athletes' Health in many ways. The research describes that Rehabilitative Strategies Post ACL Reconstruction related to Accelerating Return to Play. The study is divided into five sections. first represents the introduction, which includes objectives related to the rehabilitative strategies. The second portion describes the literature review, and the third section explains the research methods. The fourth section also explains the result and its descriptions. The last portion describes and summarizes overall research related to them.

2. Literature Review

Studies suggest that actual specialists & robust coaches are expanding their endeavours to work with more prominent competitors' mental commitment over helpful activity execution to all the more likely reestablish non-impaired myoneural management initiation adequacy and schedule. The knee support plan and application desires to advance to match these developments more readily and their effect on the restoration plan schedule. This study sums up present anterior cruciate ligament careful, clinical, & recovery intercessions & subsequent patterns(Nyland et al., 2016). The study gives proposals on the best way to carry out these into work on, discussing preparing arranging and scheduling, & recommends explicit covering to screen work & while the competitor might advance to the following stage (for example halfway restoration passage standards). This study talks about how to streamline the beginning phase restoration process post anterior cruciate ligament reconstruction. Beginning phase recovery is the fundamental establishment for fruitful restoration post anterior cruciate ligament reconstruction (Buckthorpe et al., 2024). This study researches whether a sped-up recovery track might improve power and practical balance after anterior cruciate ligament reconstruction unless it influences laxity. Sped-up recovery is delivered before progress in power and jumps less unless expanding unite laxity(Ebert et al., 2022). Scholars suggest that the front CL tear addresses the greater part of all toggle athletic wounds, including body revolutions and abrupt shifts in course. Anterior cruciate ligament reconstruction is executed with the cripple or homologous patellar ligaments, albeit the decision of unite is as yet an open & continually developing subject. Abdominal-lateral tendon reproduction and fix of menisci slope tear related to anterior cruciate ligament reconstruction have, as of late, been proposed as systems for further developing toggle joint strength(Goes et al., 2020). Researchers reveal that the reason for this medical discourse is to provide a progression of proven methodologies capable of being carried out by practitioners who are liable for the restoration of sufferers later in anterior cruciate ligament reconstruction. This medical analysis talks about procedures to improve and speed up the recuperation of toggle flexor force post-medical procedure, to help the practitioners with proof-based techniques to carry out medical exercises. 2 procedures occur to standardize quads force afterwards medical procedure, restricting force misfortune after wound &

medical procedure and amplifying and speeding up the recuperation of solidarity following medical procedure(Buckthorpe et al., 2019). Studies elaborate that Upgrading the practical recuperation interaction is essential to improve sufferer results after significant wound like foremost CLR. This expects, to some degree, an excellent, unique examination, yet additionally, a way to deal with and interpret the present investigation toward training to conquer the exploration and execution boundaries. This remembers research for anterior cruciate ligament reconstruction competitors, yet research on different taxonomies, whereby few alterations could be important to the anterior cruciate ligament reconstruction sufferer(Buckthorpe et al., 2021). Studies explain how specialists could advance myoneural recovery to further develop sufferer results after anterior Cruciate Ligament fix by inspecting the latest examination outcomes & moving them toward pragmatic helpful practices. A continuity of therapy in accordance with the mind-boggling snare of natural responses, engine study hypotheses, & novel patient requests demands the incorporation of study and medical exercise in this area. To achieve anterior cruciate ligament restoration to the latest levels, this section plans to go about as a scope, directing professionals, what's more, analysts beyond the bond of examination & practice(Khan, Sundus, Siddiqui, & Malhotra, 2024). This study leads schemes that come back competitors to contest at the most extreme execution while limiting the gamble of re-victimization. Researchers have worked over a system commonly utilized in group activities that intends advancement come from common to explicit. The movement is achieved using engine erudition standards and thoughtfulness regarding hype complexity, that portrays circumstance athletics(Fort-Vanmeerhaeghe, Arboix-Alió, & Montalvo, 2022). The basic purpose of this study is to sum up suggestions & assess the nature of worldwide Clinical exercise rules for restoration following Anterior cruciate ligament remaking. The nature of the clinical practice guidelines in Anterior cruciate ligament restoration was great, however whole clinical practice guidelines revealed unfortunate materialness. Prompt knee assembly & power preparation ought to be utilized. Nonstop inactive movement and practical supporting ought to be shunned(Andrade, Pereira, van Cingel, Staal, & Espregueira-Mendes, 2020). Studies claim that the singular training of the performer through the game's physical therapist & consistence with the preparation schedule via the performer are main variables in the recovery cycle. To limit re-victimization gamble & to expand the performer's profession, ideas of football-explicit wound counteraction projects ought to be integrated toward the preparation routine within and later the recovery of performers post Anterior cruciate ligament remaking(Bizzini, Hancock, & Impellizzeri, 2012). The goal of this research was to break down the extra physiatrist mediations executed in normal recovery projects that further develop beginning phase anterior cruciate ligament restoration. For this orderly audit, researchers adhered to the sequelize rules. Scholars led a writing survey utilizing computerized data sets. Essential results were torment, dropsy, muscular power, & knee capability. The

gamble of predisposition and logical nature of contained examinations were evaluated with the Burglarize two & Pedro climb(Kochman, Kasprzak, & Kielar, 2022). Scholars explain that anterior cruciate ligament wounds are amid the best extreme knee wounds in world class athletic, along with elevated physical issue weight and re-victimization danger. In spite of broad writing on the wound and the greater frequency of wound and re-victimization in woman competitors, there is restricted proof on the re-visitation of game of world class woman footballers pursuing Anterior cruciate ligament. Return to sport is better seen on a continuity adjusting the recuperation and recovery procedure with a definitive point a re-visitation of execution(Taberner et al., 2020). Studies show that restoration technique has turn progressively quite reliant, & the latest conditions being used are speeding up persistent recuperation. RTS is an especially significant element for the overwhelming majority Anterior cruciate ligament reconstruction sufferers, & recuperation has a significant mental part that has as of late been tended to in the writing, with definite fundamental discoveries(Jenkins et al., 2022). The point of this study is to refresh recently distributed recovery rules, utilizing the latest exploration to mirror the latest proof for the executives of sufferers subsequently front cruciform tendon recreation. The attention will be on latest ideas in restoration mediations and alterations required for attendant medical procedure and bacteriology(Adams, Logerstedt, Hunter-Giordano, Axe, & Snyder-Mackler, 2012). Studies explain that to screen availability for RTS, approved estimation devices ought to be used alongside practical evaluations to handle myoneural lacks. Patient detailed result estimates and mental availability ought to be considered while evaluating competitors' preparation to get back to play. As competitors progress move back to brandish, Anterior cruciate ligament wound avoidance preparing projects ought to be carried out on a continuous premise(Stinson et al., 2020). Scholar studies reveal that the motivation behind this Logical Critique is to introduce an illustration of a moderate, terminal RTS convention that is designated to estimated shortfalls of neuromyic manage, force, strength, & useful balance that are reconstructive milestones after Anterior cruciate ligament reproduction. The intended RTS preparing convention consolidates quantifiable estimation apparatuses that will give the competitor goal input and designated objective setting(Myer, Paterno, Ford, & Hewett, 2008). Scholars examines that fruitful restoration of the Pediatric sufferer after Anterior cruciate ligament reproduction is centered around tending to normal weaknesses observed after a medical procedure whereas zeroing in on the special requirements of the youngster. The accompanying part will zero in on introducing these extraordinary variables important to contemplate while effectively restoring this populace(Paterno & Filipa, 2018). Scholars reveal that front CL remaking should be joined with nitty gritty surgical restoration for patients to get back to their pre-physical issue action planes, & that the recovery interaction is basically as significant as the recreation medical procedure. Writing concentrates on center around how ahead of schedule in the surgical

anterior cruciate ligament restoration period recovery procedures can be started(Saka, 2014). This study particularly centers around the recovery and back in action from retardation and shift in course unambiguous wounds and starts by insight the outer burdens experienced throughout that activities and variables (for example development method) that impact this stacking to give a structure to which restoration can be planned. The study finishes up by illustrating the significant periods of the restoration cycle to stay away from recovery disappointment - specifically, setting up the tissues for the automatics burdens related with focused energy assignments, fostering the essential actual characteristics to adapt to the errand requests, and playing out the undertakings in an ideal way in shut & open circumstances suggestive of certifiable game(Herrington & Jones, 2023). Researchers suggest about therapy of the sufferer perusing careful remaking of the ACL. Different periods of restoration are talked about with accentuation on speedy recovery of detached movement, former load carriage, supporting, dynamic chain works out, myoneural electric excitement & sped up recovery. In spite of the fact that proof prevails for the therapy of the carefully recreated cruciform tendon, further is expected to more readily characterize explicit time spans for progression(Manske, Prohaska, & Lucas, 2012). This study demonstrated that a decent recovery program, with requesting standards might lessen the gamble of re-assault, set up the competitor to execute at the equivalent pre-assault degree & safe the protected progress of the performer from physical therapy to typical preparation. Additional examination is required to decide accurate models for the RTS. This obviously will prompt a greater level of effective RTS(Kyritsis & Witvrouw, 2014). Scholars investigate the post employable mending of foremost cruciform tendons in aggressive competitors, underscoring novel & laid out strategies, methods, & methodology in the writing over a deliberate survey. The pre-employable stage assumes a fundamental part in post-usable Anterior cruciate ligament recuperation, performing collaboratively with the post-employable stage to speed up the mending system beyond medical procedure and grant better amazing recovery of lost capabilities(Szabo et al., 2022). This survey portrays the natural, bionic & conduct reasoning rear an RTS scaffold project utilized prevalently with non-first class, youngster and juvenile secondary school & school competitors perusing foremost cruciate tendon recreation. In light of the recently detailed adequacy of this development based helpful activity project researchers suggest that additional projects, for example, standard work on keeping discharge from post-careful physical therapy and prior RTS navigation(Nyland et al., 2023). The study goal is to distinguish patterns and holes in return-to-play conventions in view of the areas of the international classification functioning structure. This audit features main patterns and holes in existing return-to-play conventions for upper leg tendon wounds. The conventions might be worked on by conforming to the International CF, explicitly over the incorporation of natural and individual variables. This might actually make ready

for a normalized Anterior cruciate ligament return-to-play convention(Jain, Tomas, & Rosenbaum, 2024). Researchers summarize that majority physical therapists in the United Arab Emirates were not sticking to the majority suggested return to sport models post anterior cruciate ligament reproduction in their medical practice, & no one of the assessed physical therapist-associated components revealed a critical relationship with return to sport rules observing anterior cruciate ligament remaking(Ali, Ferreira Aquino, Ammar, & Arumugam, 2024).

3. Methods

The research describe that Rehabilitative Strategies Post ACL Reconstruction related to the Accelerating Return to Play. The research describes that theoretical and numerical analysis related to the variables. the research based on the primary data analysis for measuring the result used Smart PLS software. The descriptive statistical analysis and correlation coefficient also that smart PLS Algorithm model used for determine the relation between them. According to the research ACL surgery becomes less invasive and more anatomic in recovering the natural structure and functions of ACL. The understanding of ACL function linked with knee tissues is progressively increased. The process of learning regarding the muscles and nerves respond when knees are stressed is still ongoing (Buckthorpe et al., 2021). The anatomy of ACL and the structure of the knee are yet under discussion. Researchers recommend the anatomic approach for ACL so that original tissue can be preserved as much as possible and this method is more efficient than non-anatomic approach. Still, it was not confirmed whether this would last long or not (Nyland et al., 2016; Polachini et al., 2022).

3.1 Smart PLS Algorithm Model

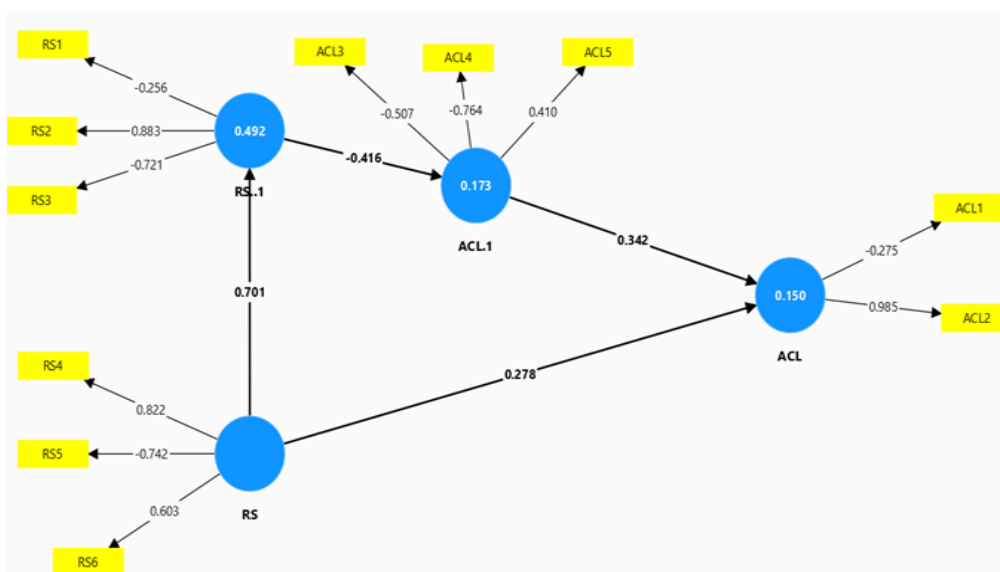


Figure 1: Smart PLS Algorithm Model

The above model of figure 1 represents that smart PLS Algorithm result describe that RS.1 and RS according to the model its shows -0.256, 0.883, -0.721, 0.822, -0.742 also that 0.603 its shows that 25%, 88%, 60%, 72% respectively. The ACL.1 shows that 34% positive link with ACL. The RS also represent that 27% link with ACL.

3.2 Descriptive Statistical Analysis

Table 1: Result of descriptive statistical analysis

NAME	NO.	MEAN	MEDIAN	SCALE MIN	SCALE MAX	STANDARD DEVIATION	EXCESS KURTOSIS	SKEWNESS	CRAMÉR-VON MISES P VALUE
RS1	1	1.510	1.000	1.000	3.000	0.610	-0.305	0.794	0.000
RS2	2	1.490	1.000	1.000	3.000	0.610	-0.184	0.874	0.000
RS3	3	1.592	2.000	1.000	3.000	0.603	-0.589	0.496	0.000
RS4	4	1.551	2.000	1.000	3.000	0.537	-1.139	0.198	0.000
RS5	5	1.653	2.000	1.000	3.000	0.624	-0.613	0.426	0.000
RS6	6	1.510	1.000	1.000	3.000	0.576	-0.554	0.621	0.000
ACL1	7	1.837	2.000	1.000	3.000	0.681	-0.820	0.222	0.000
ACL2	8	1.510	1.000	1.000	3.000	0.539	-1.068	0.361	0.000
ACL3	9	1.755	2.000	1.000	3.000	0.624	-0.557	0.236	0.000
ACL4	10	1.776	2.000	1.000	3.000	0.708	-0.945	0.361	0.000
ACL5	11	1.551	2.000	1.000	3.000	0.574	-0.694	0.463	0.000

The above result shown in table 1 represents that descriptive statistical analysis the result shows that mean value, median rate, the standard deviation rate, the skewness value also that probability value of each variable. the RS1,2,3,4 and 5 these are considering as independent variable according to the result its mean values are 1.510, 1.490, 1.592, 1.551, 1.653 these are shows that positive average value of mean. The standard deviation rate is 61%, 61%,60% and 53% also that 62% deviate from mean. The skewness rate is 79%, 87%, 49%, 19% and 42% skewness value of rehabilitative strategies. Table-1 describes that ACL1,2,3,4 and 5 these factors consider as dependent its average value of mean rate is 1.837, 1.510, 1.755, 1.776 and 1.551 these are shows that positive average value of mean. The standard deviation rate is 68%, 53%,62%,70% and 57% deviate from mean. The skewness rate is 22%, 36%, 23%, 36% and 46% skewness value between them. the overall probability rate is 0.000 shows that 100% significant value between them. ACL repair is the current standard surgical therapy for ACL injuries. This operation often involves placing a graft, or a portion of tissue, in the knee to replace the torn ACL via a minimally invasive surgery with minor incisions. Most ACL procedures at HSS are ACL reconstructions. Imaging studies have shown that ACL

restoration can help prevent knee osteoarthritis.

ACL repair is an earlier procedure that involves stitching the damaged ACL tissue back together using sutures rather than reconstructing it with a graft. Today, ACL repair has been modernized, and some surgeons believe that modern ACL repair procedures may be performed safely and with a faster recovery than ACL reconstruction. However, there is minimal evidence on outcomes, and failure rates for ACL repair appear to be 5 to 10 times greater than those for ACL reconstruction in persons of all ages. This leads to graft failure rates as high as 50% in teenage patients. Another form of ACL repair treatment is the bridge-enhanced ACL repair (BEAR), which adds bovine-derived tissue to an existing ACL repair. This technique offers promising results, but several studies are presently being conducted to see how well people respond to it. Due to the significant chance of failure, it is not recommended that individuals under the age of 22 undergo this treatment. When ACL surgery fails, physicians must perform a revision procedure (a second operation) to restore the torn ACL graft. If a repaired ACL fails, it can only be corrected by surgical ACL reconstruction. Re-doing any type of ACL surgery increases the chance of failure, lowers the likelihood of successful return to sports activity, and increases the risk of developing knee osteoarthritis. It is critical for patients of all ages to have a good first surgery, but this is especially true for young athletes. A botched operation can be disastrous for them in the near term, causing them to miss years of participation in their favorite sport. In the long run, it might result in persistent discomfort and loss of knee function.

3.3 Correlation Coefficient

Table 2: Result of Correlation Coefficient

	RS1	RS2	RS3	RS4	RS5	RS6	ACL1	ACL2	ACL3	ACL4	ACL5
RS1	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RS2	-0.178	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RS3	-0.044	-0.344	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RS4	0.201	0.360	-0.566	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RS5	-0.125	-0.197	0.545	-0.586	1.000	0.000	0.000	0.000	0.000	0.000	0.000
RS6	-0.276	0.683	-0.223	0.147	-0.132	1.000	0.000	0.000	0.000	0.000	0.000
ACL1	-0.045	0.045	0.037	0.079	0.011	-0.048	1.000	0.000	0.000	0.000	0.000
ACL2	0.387	0.047	-0.113	0.509	-0.141	-0.247	-0.107	1.000	0.000	0.000	0.000
ACL3	-0.101	0.262	-0.157	0.037	0.044	0.348	0.146	-0.114	1.000	0.000	0.000
ACL4	-0.396	0.396	0.024	0.003	-0.084	0.381	-0.034	-0.181	-0.078	1.000	0.000
ACL5	0.071	-0.130	-0.117	0.074	-0.036	0.076	-0.083	0.213	0.149	-0.248	1.000

The above result shown in table 2 describes that correlation coefficient analysis related to the dependent and independent variables. the RS1,2,3,4 and 5 these are show that some positive and negative correlation coefficient

analysis. The ACL1,2,3,4 and 5 also that explain the 39%, 2% 38%, 3% interrelation between them. It was studied that athletes suffering from ACL injury who wish to RTS (Return to Sports) will need to experience surgery. Therefore, the physiotherapist who communicates with injured athletes must communicate with the surgeon. The surgeon will help the therapist provide the facets of treatment, graft type, chances of meniscus repair etc. According to some studies, players' integration with teammates improves their chances of performing well. Athletes regularly participate in restoration, gym and training sessions but with restrictions (Louis, Audrey, Mark, & Patrick, 2023).

Moreover, athletes should avoid damaging the wounded area and at a psychological level, the participation of athletes in the group signifies a greater milestone in recovery. At the physical level, the focus is on refining motor skills (Fort-Vanmeerhaeghe et al., 2022; Schoenfeld & Grgic, 2018). Almost 64% of all knee injuries in sports come from the rupture of the anterior cruciate ligament (ACL). The increase in the number of athletes after the surgery of ACLR has been seen for a few decades due to the advancement in surgery and rehabilitation sessions. The patient post-ACLR generally faced neuromuscular damage till two years; such factors can be a risk of re-rupture of ACL and early progression of osteoarthritis. The term return to play (RTP) is defined as the return of athletes to sports with the same level of energy as before the surgery of ACLR. Earlier, the criteria for RTP post-ACLR were the time of six months till the player recovers fully. Conversely, nowadays the RTP process along with guidance and testing, is divided into three phases: return to participate, return to play and return to perform (Barfod, Rasmussen, Blaabjerg, Hölmich, & Lind, 2019).

4. Conclusion

For the stabilization of the knee joint, the ACL plays a crucial role by controlling tibia anterior translation. It also includes mechanoreceptors that aid in maintaining the neuromuscular joint. ACL is considered one of the most common and serious locomotion injuries. The biomechanics of the joint are disturbed by rupturing of ACL leads to difficulty in the execution of daily activity. The risk of re-injury of ACL is common in youngsters due to the multifactorial factors. The re-injury in young players contributed to the higher physical activity which makes them at risk frequently. It's disappointing that many athletes are not able to go back to sports after ACLR reconstruction; many players are highly expected to return to sports however, high chances of re-injury and osteoarthritis do not allow them to play again. Many researchers suggest that rehabilitation for ACL patients must add various types of sensory and cognitive activities to improve their physical and mental health.

Youngsters do not have developed muscles, so the chances of getting ACL are high and they can re-injure again easily. After having the ACL surgery,

the therapist recommends players return to play (RTP) after they fully recover and it's safe for them to play. Many factors need to be measured before RTP following the RCL construction; one of the main factors is physical examination. This examination includes the reduction of knee outpouring, complete locomotion equal to uninjured area, less or no pain during physical activities etc. Many types of programs such as ACL- SPORTS have been launched for athletes who undergo ACL reconstruction surgery. These programs aim to regain the strength and performance of athletes who wish to return to sports. After an ACL injury, the physiological recovery poses many challenges that include self-confidence, anxiety and many other factors.

The physicians, therapists and physical trainers use the clinical guidelines to improve the process of physiological injury. It is difficult to decide when injured athletes after ACL can return to sports. Sometimes, athletes having a deep passion for sports want to return earlier to play sports, and they are allowed to go earlier from rehab even if they are not completely fit for sports. This will increase the chance of knee e-injury in them. The therapist and athletes must check the athlete's physical and mental condition before they go back to sports.

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