
EFFECTIVENESS OF PHYSIOTHERAPY IN REHABILITATION AFTER INJURY OF ANTERIOR CRUCIATED LIGAMENTS

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Abstract: Rupture the front one crossed ACL ligaments are mostly mentions the code active and young people an athlete and can to have permanent psychological and physical consequences. Clinical assessment and treatment injuries it is broad research thesis in orthopedics. ACL injury most often as a result by contact and contactless principle, that is the first is more common the code male half, while the other a lot more common the code a woman. Mentioned injury most commonly be surgical taken care of, also characterizes it relatively high rate permanent rupture. The result be displayed psychological load for athletes like and long-term weather period rehabilitation. Goal research: Determine efficiency physiotherapy in rehabilitation after injuries front ones crossed ligaments which includes surgery reconstruction by application physical therapy and kinesitherapy. Method of work: The search included review relevant base data: Medline, PabMed, Google Scholar, Research Gate. By display 8 randomized studies were included in the literature review clinical research. Based on of which it was made plan view and program rehabilitation an athlete after injury the front one crossed ligament, the efficiency program physical therapy and kinesitherapy. Research rehabilitation an athlete the code injury to the anterior cruciate ligament is non-experimental qualitatively research, that is scientific literature review. Results: Research on efficiency is presented procedure physical therapy and kinesitherapy in rehabilitation an athlete after injuries the front one crossed ligament. Conclusion: Rehabilitation athlete (physical therapy and kinesitherapy) give significant results in sense reduction pain, increase volume movement and strength muscles after ACL injuries.

Keywords: rehabilitation, athletes, ligaments, physical therapy.

1. INTRODUCTION

Injuries the front one crossed ligament (ACL) are one of the most widespread and the most traumatic injury which perceives the code athlete. The big one number an athlete be effectively subjected to ACL restoration, while failure recorded between 2% and 27% which indicates on needs revisions. The main one sample a fiasco of ACL reconstruction is malignancy bones (Sun et al., 2022). ACL is very honor injuries in the United States, percentage is considered to be on annual level happens about 200,000 of them rupture. ACL reconstruction is obvious surgical method, especially for young people athletes. Athletes who are subjected to operational grip knees never I can't do it anymore return on mine the usual function knees. Also there is constant risk of re- ruptures of the ACL, such as and earlier osteoarthritis in the operated knee (Rodríguez- Merchán et al., 2021). Systematic and gradual analysis eventual factors risks, especially with use clinical verification tests neuromuscular functions affected extremities athletes in comparison with healthy extremity emphatic indexes symmetry limb (LSI) which is crucial criterion for judgment. It has been proven that a more symmetrical (LSI) limb diminishes degree of again injuries. Returning athletes again sport they have increased incidence of again injury for 6 times in time period of two years after operations. Also athletes who are managed to return again sport they show shorter duration careers, like and reduction performance games. Final goal everyone the athlete is again returning sports on that the level it was before injuries, like and exposure unnecessary risk athletes of again injuries (Giesche et al., 2020).

2. MATERIALS AND METHODS

Systematic literature search of relevant databases, Medline, PabMed, Google Scholar, Research Gate which is coordinated within the framework of the system of PRISMA (Moher D., 2009) by keeping the main search keywords: rehabilitation, athletes, ligaments, physical therapy from 2014 to 2023 Articles were also selected from references of relevant articles, by searching on different websites of magazines. Without any restrictions in terms of time period, vocabulary, religiosity, all those studies that will cover certain criteria will be included: (1) Respondents

of both sexes; (2) rehabilitation; (3) anterior cruciate ligament; (4) athletes; (5) physical therapy. Animal studies, records and case series, conference abstracts, or undated letters were excluded.

3. RESULTS

Through a scientific review of the literature, the results of the importance application physical therapy the code an athlete after injuries the front one crossed ligament. 397 papers, published in the period from 2014 to 2023, extracted from 4 databases, were taken into account. After finishing the copies of studies and publications that are irrelevant, 201 papers were further processed, while only 41 papers were read in full, only 8 papers satisfied the 5 criteria for implementation in the scientific literature review. Everything studies were randomized controlled examination . In the total number of 8 studies, 399 respondents were included, determine efficiency physiotherapy in rehabilitation after injuries front ones crossed ligaments which includes surgery reconstruction by application physical therapy and kinesitherapy. The review of these 8 studies showed that there is big significance application physical therapy in rehabilitation person after injuries the front one crossed ligament. Picture number 1.

Figure 1. PRISM DIAGRAM OF RESEARCH INCLUDED IN THE REVIEW

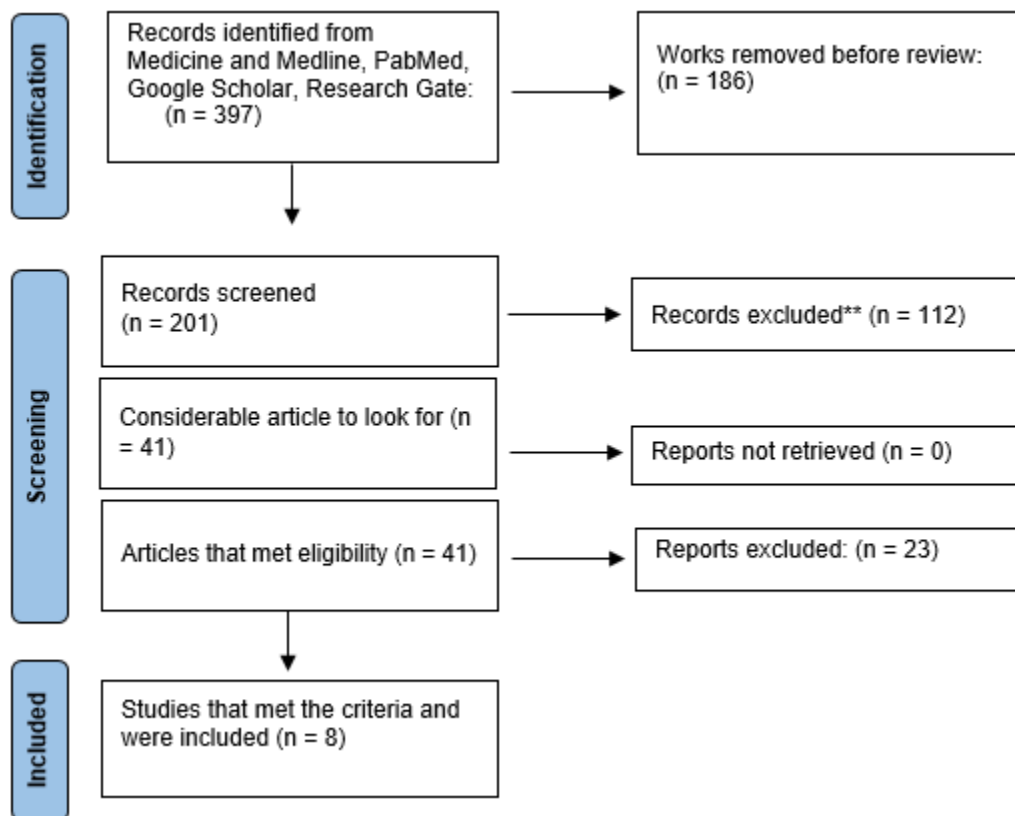


Table 1. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Vidmar et al., 2020.	Eccentric isokinetic training is superior to constant load eccentric training for quadriceps rehabilitation after anterior cruciate ligament reconstruction.	Explore efficiency eccentric Conventionologist training and eccentric isokinetic training on strength, mass muscular quadriceps and performance functional after reconstruction crossed the front one ligament the code recreational players (ACL).	30 men recreational athlete, who are received the usual rehabilitation program that was meeting of ACL reconstructions. Conventional group (CG, randomized, n= 15), isokinetic group (IG, n=15). The program lasted 6 weeks, a dynamometer isokinetic or program eccentric on extensor training chairs quadriceps. Estimate is measured functional self-awareness (question mark), quadriceps muscle mass (magnetic resonance), power (dynamometer isokinetic). The assessment is established before and after program.	Improvement was significantly recorded in isokinetic mass group – muscular, eccentric and isometric peak rotating moments in relation on randomized group of the respondents.	Eccentric isokinetic training, provides better answers of eccentric conventional strength training – and muscular mass quadriceps after ACL reconstructions.

Table 2. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Lim et al., 2019.	Anterior cruciate ligament reconstruction on proprioception before and after treatment and isokinetic knee strength. Rehabilitation at home and supervised comparison.	Estimate differences in improvement endurance, strength knees isokinetic and proprioception on recovery under control supervisor faces (SR) or code houses (HBR).	A total of 30 respondents, randomly distributed. Biodex was used for measurement isokinetic strength knees and proprioception. Before and after treatment was used also and system stability.	SR group confirmed significantly improvement, doc at HBR Group they are not established differences. The type of exercise had an effect on proprioception, which has been observed before test. Isokinetic strength knees it is not proved improvement in between two groups.	Improvement of proprioception was observed in athletes after ACL surgery.

Table 3. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Moran et al., 2019.	Reconstruction of the anterior cruciate ligament after the application of electrical functional stimulation.	Feasibility electrical functional stimulation quadriceps on the usual rehabilitati on adverb walking in phase initial on	23 respondents, ordinary rehabilitation treatment. The analysis was performed up to 2 weeks before ACL and 4 weeks after completion operations. Measure instruments are were isometric strength	Speed and symmetry walk on the ACL it is not proved improvement after 4 weeks of operations. Electric functional stimulation improved 82 % strength	Electric functional stimulation is effective method for improvement strength quadriceps. Kinetic and kinematic studies, I can be usable for understanding effects functional electrical stimulation quadriceps after the ACL. Also wound rehabilitation the usual is achievable

		the ACL.	quadriceps, symmetry walk on once extremity and speed walk _	quadriceps, better symmetry the extremity is also confirmed.	treatment solution wounds interventions after the ACL.
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Table 4. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Harpur et al., 2018.	Cross-training recovery improves quadriceps strength after ACL reconstruction.	To see benefits eccentric and concentric cross effect on strength quadriceps and progress functions knees after reconstruction the front one crossed of the ACL ligament.	48 respondents, who were exposed ACL tendon reconstruction knees method by autograft. 3 weeks after operations, divided into 3 groups (Concentric CE), (Eccentric CE), (Control). Post- surgical rehabilitation program are had everything groups, two scientific groups are achieved isokinetic training for health knee. Power isometric quadriceps was determined by MVCI, 4 weeks before training, 12 weeks after training and 24 weeks after operations. Jump to one legs is also measured at 24 weeks after operations.	Concentric and eccentric the group determined improvement forces quadriceps in both knees, at 12 and 24 weeks after operations. The MVIC of the quadriceps was in the temporal determinants improved. Strength is increased by 28% and 31% in concentric and eccentric groups. It's not there was an improvement jump on one legs among groups.	Strengthening quadriceps eccentric and concentric in early phases rehabilitation healthy of the ACL limb, increased recovery strength quadriceps after reconstruction extremities after operations. It is of great importance applications in the early phases rehabilitation, in order to build and established strength quadriceps.

Table 5. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Forogh et al., 2019.	The use of high-frequency transcutaneous electrical nerve stimulation in the first phase of post-ACL repair rehabilitation does not improve pain and function in male youth athletes more than exercise	Prove whether the electric transcutaneous nervous stimulation helps _ athletes during the first stages of rehabilitation to be better after operations reconstruction crossed the	70 men athlete, after ACL operations. 2 groups, group 1 had semi-supervisory exercises like and TENS with high frequency intensity, duration 35 minutes every day, while the second group performed only exercises. Total 20 sessions, duration 1 month. Used are score for analog visual scale (VAS), International questionnaire for documentation knees (IKDC) and scope bending motion _ knees (ROM). At	VAS scale, IKDC questionnaire and ROM flexion knees in both groups have increased _ during time. There is no improvement drastically differentiated between two examined groups, what says no _ additional improvements code respondents who are	Application of TENS does not lead to improvement functions knees and pain in the relationship on only applied exercises.

	alone	front one ligament in the first month.	the beginning and on the end research.	additionally TENS exercises.	had with	
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Table 6. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Koyonos et al., 2014.	Application of cryotherapy preoperatively in anterior cruciate ligament reconstruction	Preoperative cryotherapy with postoperative standardized treatment plan indicates on low pain like and less consumption medicines against pain in comparison with respondents who only they have postoperative standardized treatment plan reconstruction the front one crossed ligament.	53 respondents, two groups. Group 1 did not used cryotherapy preoperatively, while group 2 used from 30 to 90 minutes cryotherapy preoperatively. Visual was used analog pain assessment scale.	Interrogated group 2 registered smaller pain and consumed less drugs in comparison with group 1. It was also achieved maximum flexion wrist knees.	Security and efficiency cryotherapy preoperatively in multimodal reduction system _ hurts the code patients who are exposed ACL reconstruction.

Table 7. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Tohidirad et al., 2023.	Effects of anodal transcranial direct current stimulation on the effectiveness of conventional physiotherapy on muscle performance and balance in athletes with anterior cruciate ligament injury.	Efficiency anodic stimulation transcranial one-way by current (tDCS) on primary cortex motor, muscular and postural control the code an athlete with with an ACL injury.	All respondents are had 20 minutes tDCS during 10 sessions, while code _ fake groups tDCS was off for 30 seconds after inclusions. The power was measured arm flexors and extensors at 30 and 60 degree angles knees and center pressure.	Center pressure is reduced, while in the fake group it is not there were changes. Force flexors and extensors the knees are enlarged in both groups, but significantly improvement was noted in the examined to the group.	tDCS by application can improve efficiency on center pressure knees, while ultimate result affects on improvement postural controls the code an athlete with ACL injury.

Table 8. Summary of study characteristics

Author(s).	Name of the study	Research objective/s	Research method/s	The results	Conclusion
Grant et al., 2014.	Comparison of a home rehabilitation program versus a supervised physical therapy program after anterior cruciate ligament reconstruction	Examine effect program rehabilitation the code house in relation on patients who are undergo physical therapy in reconstruction the front one crossed ligament.	145 respondents, aged 16-59 years. Respondents code houses are had only 4 sessions physical relationship therapy on respondents under control physical therapies that are had 17 sessions during the first 3 months rehabilitation after injuries. Standardized rehabilitation program are had all respondents. Measures below were active – to be supported movement flexions knees, passive movement extensions knees and movements in the knee during walking total extent movement.	Respondents the code houses are had better result total volume of movement in extension and acceptable by inflection in relation with group with usual program rehabilitation. It's not was noticeable differences in movements during walking	Physical therapy under control was better method in achieving bigger volume movement knees in the first 12 weeks after reconstruction the front one crossed ligaments in the relationship on standard rehabilitation program physical therapy.

4. DISCUSSION

Power was analyzed over time, where a difference of 10% to 12% was observed. Proprioceptive and strength training has been a useful method for improving functional ability and sense of satisfaction (Wright et al., 2008). Postoperative ACL rehabilitation recommends that knee mobilization and strength training should be used. Wound exercises with full load, open and closed kinetic chain, ice therapy and electrostimulation neuromuscular can all be applied according to individual circumstances. The guidelines recommend eliminating constant passive movement and strengthening functionality (Andrade et al., 2020). A great improvement of cryotherapy was noted in quadriceps strength. Cryotherapy tries to reduce the ejection of sensory receptors and weaken the conduction of the articular nerve, which directly affects the reduction of impulse transfer. of afferents affecting the toxicity of knee reflex excitability. TENS has proven a low level of effect that affects the improvement of the efficiency of the knee joint. Ultrasound therapy and vibration have also shown insufficient efficacy. Taping, tightening, thermotherapy and soft tissue relaxation methods have no clinical benefit in treatment (Sonnerly-Cottet et al., 2019). Neuromuscular electrical stimulation fully prevents muscle atrophy (Toth et al., 2020).

5. CONCLUSIONS

Physical therapy procedures such as cryotherapy, electrical muscle stimulation (EMS), transcutaneous electrical nerve stimulation (TENS) and pulsed electromagnetic field (PEMF) treatment give positive results in the rehabilitation of anterior cruciate ligament injuries, with the aim of reducing pain and swelling, increasing muscle tone and reduction of recovery time. Kinesitherapy modalities, which include: eccentric training, proprioception exercises, plyometric training and application of closed kinetic chain (CKC) exercise programs, have positive effects in the rehabilitation of anterior cruciate ligament injuries in terms of structural changes in muscles, improvement of neuromuscular and functional status, and increase functionality of the knee joint.

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