International Journal of Medical Science and Clinical Research Studies

ISSN(print): 2767-8326, ISSN(online): 2767-8342

Volume 03 Issue 09 September 2023

Page No: 1895-1900

DOI: https://doi.org/10.47191/ijmscrs/v3-i9-16, Impact Factor: 6.597

Functional Evaluation of the Knee in Athletes and Sportsmen Undergoing Anterior Cruciate Ligament Reconstruction Surgery

Cristianne Confessor Castilho Lopes[1], Daniela dos Santos[2], Julio César Moriggi[2], Daiana Caide Lopes Brandenburg[2], Nycole Przybysz Ribeiro de Souza[2], Simone Cristina Fuck Felipus[2], Aline Tibes Felipus[2], Mushue Dayan Hampel Vieira Filho[2], Maria Luiza Beck[2], Maria Tereza Schlischting da Silva[2], Sharrine Rau Dabbous[2], Valentina Cantele Della Latta[2], Maria Eduarda Castilho Lopes[2], Eduardo Barbosa Lopes[2], Marilda Morais da Costa[3], Patrícia Cota Lima[4], Carolina Della Latta Colpani[5], Lucas Castilho Lopes[6], Livia Strital Defaveri[7], Adriano Almada Militz[8]

[1]University of Joinville Region – Joinville – SC - Brazil
[2]Alto Vale do Rio do Peixe University - Caçador - SC - Brazil
[3]Association Educational Lutheran - IELUSC College - Joinville – SC – Brazil
[4]Federal University of Rio Grande - Rio Grande – RS – Brazil
[5]Lutheran University of Brazil – Canoas – RS – Brazil
[6]Federal University of Santa Catarina – Florianópolis – SC – Brazil
[7]University of Vale do Taquari - Lajeado-RS – Brazil
[8]Franciscan University - Santa Maria-RS - Brazil

ABSTRACT

The knee is a joint made up of bones, muscles, ligaments and cartilage. The anterior cruciate ligament is a fundamental part for the proper functioning of the knee, being responsible for the stability of the joint, also being the main affected in ligament injuries of the knee. Most of these ligament injuries need to be treated surgically and after surgery, physiotherapeutic treatment is essential for the rehabilitation of the patient, aiming at a better return to their daily or sports activities. Several ways are found to assess whether an individual is fit or not to return to sport after an anterior cruciate ligament reconstruction surgery. Validated questionnaires are highly reliable and effective, proving to be very useful as a complementary way to assess the individual's discharge to return to sport. This study aimed to verify the evaluation of knee function in athletes and sportsmen undergoing reconstruction of the anterior cruciate ligament. The research is characterized as a descriptive, cross-sectional study with a quantitative and qualitative approach being applied through questionnaires in online format, prepared in Google Docs®. The study included a questionnaire with information on the participant's profile, and two knee assessment questionnaires: the International Knee Documentation Committee (IKDC) Questionnaire for assessing symptoms, function and the degree of sports activity and the Previous Cruciate Ligament - Return questionnaire to Sport After Injury Scale (ACL-RSI) to assess the psychological impact of returning to sport after ACL reconstruction. The sample, composed of 23 volunteer participants, including 8 athletes and 15 sportsmen, obtained as results an average of 85% points in the IKDC questionnaire and 61% points in the ACL-RSI Brazil questionnaire for athletes and the results of 74% points in the IKDC questionnaire and 56% points in the ACL-RSI Brazil questionnaire for sportsmen. The psychological issue proved to be a greater difficulty for patients to return to sports, when compared to the functionality of a knee after reconstruction of the anterior cruciate ligament, which in turn, proved to be highly effective both in its surgery and in its post-operative and rehabilitation.

KEYWORDS: Knee; Functionality; Anterior Cruciate Ligament.

ARTICLE DETAILS

Published On:
13 September 2023

Available on:
https://ijmscr.org/

INTRODUCTION

The knee is formed by three bones: tibia, femur and patella, which form two joints: tibiofemoral and patellofemoral (TAYFUR; TAYFUR, 2023; THOMEER et al., 2021). It has two muscle groups, one with an extensor function, where the quadriceps femoris mainly acts, formed by the rectus femoris, vastus lateralis, vastus medialis and vastus intermedius muscles, and the other group with a flexor function, where we find mainly the hamstrings, composed of the biceps muscles femoral, semitendinosus and semimembranosus (CZARNOWSKI, 2022; WAGHMARE, 2020). With the function of stabilizing the knee, we find the ligaments, four in total: anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), tibial collateral ligament (LCT) and fibular collateral ligament (LCF). The knee also has two menisci, lateral and medial, found between the femur and tíbia (ATTARD; CASTILLO; ZARB, 2018; INNOCENTI; ARMILLOTTA, 2020).

Because it supports large loads and has a characteristic bone instability, the knee is a joint susceptible to the development of injuries, mainly ligament, cartilaginous or bone fractures. Traumatic ligament injuries, mainly in the anterior and posterior cruciate ligaments, are favored due to their role in stabilizing the knee when changing directions (DE SÁ et al., 2019).

ACL rupture is one of the most common injuries in the knee, and although the risk of suffering the injury is low in the general population, it is higher in the case of team sports practitioners (ARLIANI et al., 2019). Rotating movements, such as acceleration, deceleration and quick stops can cause ligament rupture, which results in joint instability that generates functional disability and pain, making the ACL the most affected ligament in knee injuries (SOARES et al., 2017).

ACL injury is treated surgically (ARLIANI et al., 2019) and aims to return the stability of the knee (DE SOUZA LEÃO et al., 2021; FLEMING; RITZMANN; CENTNER, 2022).

Physiotherapy plays an essential role in the postoperative rehabilitation of ACL reconstruction (ARAUJO, 2019; SILVA; JÓRIO MACHADO, 2022). The physiotherapist has the role of evaluating and organizing treatment in patients who have undergone ACL reconstruction surgery, both pre- and postoperatively (COSTA, 2019; COUTINHO; DE LIMA; GONÇALVES, [sd]). The objective is for the patient to return in the best possible way to carrying out their daily activities or sports, helping to relieve pain, muscle strengthening, increased dynamic control of the joint, recovery of their functions until reintegration into their activities (ARAUJO, 2019).

That said, we raise the following question: what is the level of knee functionality in an athlete or sportsperson undergoing ACL reconstruction surgery?

To answer the question, knee functionality was evaluated in athletes (people who practice sports professionally) undergoing anterior cruciate ligament (R-ACL) reconstruction surgery, and knee functionality in athletes (people who practice recreationally) submitted to R-ACL surgery and to evaluate the psychological impact on the return to sport after ACL reconstruction.

It is known that the functional rehabilitation of a patient with R-ACL is indispensable through a physiotherapy professional. Professional negligence and lack of commitment by the patient are some examples of failure in rehabilitation, which may make the person unable to return to sports or their normal activities of daily living.

Thus, the general objective of this study was to evaluate the functionality of the knee in athletes and sportsmen submitted to anterior cruciate ligament reconstruction surgery and the specific objectives were: to evaluate the functionality of the knee in athletes (practitioners of professional sports) and sportsmen (practitioners of sports athletes) submitted to ACL surgery and to evaluate the psychological impact on the return to sport after ACL surgery.

METHODS

The research is descriptive, cross-sectional and with a quantitative and qualitative approach. With the aim of demanding information from the investigator about what he wants to study, descriptive research intends to describe the facts and phenomena of a given reality. Some examples of this type of research are case studies, document analysis and ex-post-facto research (CARDOSO et al., 2019; SILVEIRA, 2009). Seeks to answer questions without interfering with reality, observes the motivation for that action in the quest to answer questions without interfering with reality, and may aim to become familiar with a phenomenon or discover a new perception or analyze points of view from different sources(SOUZA et al., 2019).

The cross-sectional type of research is included when the exposure is relatively constant and the effect or disease is chronic. It presents itself as an instantaneous cut that is made in a specific population through sampling, analyzing the members of the sample or casuistry, the absence or presence of exposure and the effect or disease. The advantages are that it is a low-cost survey and that there are virtually no follow-up losses (SILVA, 2018).

Finally, presenting a quantitative and qualitative approach, where the quantitative approach is based on the use of measurable data with the use of questionnaires, measurement and precision calculations, elaboration of indices and scales and statistical procedures explaining their existence, relationship or influence on another variable, worrying about what is common to most situations. Seeks to analyze the frequency of occurrence to measure the veracity or not of what is being investigated (FONSECA, 2012; ZAMBELLO et al., 2018).

RESULTS AND DISCUSSION

Table 1 presents the characteristics of the sample, which was composed of 23 individuals, 15 athletes and 8 athletes. Among the athletes, 75% were female, and 37.5% were aged between 21 and 30 years, with the same proportion in the age group between 31 and 40 years. 100% play football or its variations (futsal and society football). 50% of the athletes practiced the modality every day and 50% of them suffered the injury in both knees. The injury was suffered for more than 24 months in 75% of the participating athletes. In 50% of the cases the athlete suffered the injury only once. All participants underwent postoperative physical therapy, half with up to 6 months and half with 6 to 12 months of rehabilitation.

Of the 15 athletes who participated in the interview, we found that 93.3% were male and 53.3% were between 31 and 40 years old. In the same percentage of 53.3% are athletes who practice football or its variations as a physical activity. We found the same percentage of 26.7% for athletes who practice the activity 3x a week and those who practice 4x a week. There was a predominance of 66.7% of injury to the right knee and the same amount of 66.7% had the injury for more than 24 months. Among them, 86.7% had the injury only once and 93.3% underwent postoperative physiotherapy with a predominance of 73.3% performing up to 6 months of physiotherapy.

Table 1– Sample profile

	Athletes		Sportsmen	
	N = 8	**%**	**N=15**	**%**
Gender				
Feminine	6	75.0	1	6.7
Masculine	two	25.0	14	93.3
Age				
Between 10 to 20 years*	two	25.0	-	-
Between 21 to 30 years old	3	37.5	5	33.3
Between 31 to 40 years old	3	37.5	8	53.3
Over 40 years old	-**	-	two	13.3
Do you practice any sport or physical activity?				
Football (field, futsal, society football)	8	100.0	8	53.3
Bodybuilding	-	-	1	6.7
Functional training	-	-	1	6.7
crossfit	-	-	1	6.7
Others	-	-	4	26.7
How many times a week do you exercise	-	-	1	6.7
2x week	1	12.5	3	20.0
3x week	-	-	4	26.7
4x week	-	-	4	26.7
5x week	two	25.0	two	13.3
6x week	1	12.5	-	-
7x week	4	50.0	-	-
Which knee suffered an ACL injury?				
Right	3	37.5	10	66.7
Left	1	12.5	3	20.0
Both	4	50.0	two	13.3
How long have you had the injury?				
Between 6 to 12 months	-	-	1	6.7
Between 12 to 24 months	two	25.0	4	26.7
Over 24 months	6	75.0	10	66.7
Number of ACL injuries				
1 time	4	50.0	13	86.7
2 times	two	25.0	1	6.7
more than 2 times	two	25.0	two	13.3
Physiotherapy after ACL surgery				
Yes	8	100.0	14	93.3
No	-	-	1	6.7
How long of physiotherapeutic treatment after ACL surgery				
Up to 6 months	4	50.0	11	73.3

Between 6 to 12 months	4	50.0	3	20.0
I did not perform physiotherapy	-	-	1	6.7

Source: The authors (2023).

* only participants over 18 years old were part of the sample.

** result value was zero=0

Graph 1 shows the mean results of the International Knee Documentation Committee (IKDC) and Anterior Cruciate Ligament-Return to Sport After Injury Scale (ACL-RSI) questionnaires comparing athletes and sportsmen. It is observed that both the IKDC and the ACL-RSI Brazil presented a higher average in the athletes, reaching, respectively, 85% and 61%. In athletes, the average presented lower results, but not as significant, reaching 74% in the IKDC and 56% in the ACL-RSI. High values on the IKDC indicate good knee functionality, while high values on the ACL-RSI indicate little psychological impairment of return to sport.

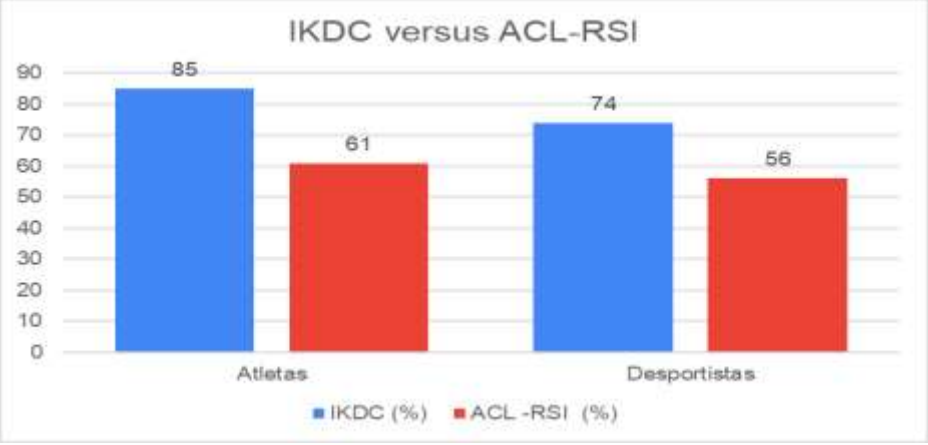
The results obtained were a little higher when compared to the study byTurck (2019), which obtained an average of 79.8% (±11.5) on the IKDC and 52.9% (± 5.3) on the ACL-RSI.

It is also noticed similarity of results with the study ofrodrigues; Almeida and Lima (2017), who used the questionnaires to characterize the sample of their study consisting of 70 participants and then apply strength and stability tests to assess patients after R-LCA. The IKDC questionnaire applied by the study had a result of 74.6% (±13.9), while the ACL-RSI questionnaire obtained 48.1% (±17.8). Of the 70 study participants, 57.1% had already returned to sport when they answered the questionnaire.

The result of the study of Silva Junior et al. (2015), demonstrated that the IKDC questionnaire presented slightly better data, reaching an overall average of 86.4%, showing us again that the R-ACL surgery is safe and returns the knee to good function after a successful recovery. The study had a very positive result, with the lowest score achieved of 72%, showing that even the lowest result obtained in the study is still a satisfactory result.

Compared to a study that aimed to assess the confidence of athletes to return to sport after an R-ACL, Marques (2016), obtained an average of 60% in the results of the ACL-RSI questionnaire, very similar to the result obtained in this study, evidencing the low confidence of patients after the injury, leading to the assertion that the psychological issue should be better addressed by trained professionals to improve the rehabilitation and return to sports, helping to avoid further injuries due to the individual's psychological condition, as this is a very important and necessary point to be taken into account in sports practitioners.

Graphic 1 -Comparison between the International Knee Documentation Committee -IKDC Questionnaires and the Anterior Cruciate Ligament-Return to Sport After Injury Scale - ACL-RSI questionnaire of athletes and sportsmen.



Source: The authors (2023)

FINAL CONSIDERATIONS

ACL rupture is an illness that affects most sports practitioners. A well-done postoperative rehabilitation is essential for the resumption of sport and for the individual's quality of life.Physical therapy plays a fundamental role in the success of R-ACL, helping the knee to return to its normal function and stability. Effective physiotherapy starts right after surgery, helping you to return to your normal ROM and avoiding postoperative complications. Rehabilitation goes through the phase of decreasing swelling and pain, helping the musculature and muscle strength to return to normal, until the period of return to sport, returning its stability and function as close to normal as possible for the joint.In the IKDC questionnaire we obtained good results. Athletes showed a slightly more satisfactory result than athletes, where the frequency of exercises can explain the greater success, but we depend on complementary studies to make such a statement. The good performance presented by the

individuals shows us a good functionality of the rehabilitated knee, showing great success in the surgical part of the process and in the physiotherapeutic postoperative period.Based on the study and taking into account the comparison with the other studies observed, we noticed a low score on the ACL-RSI questionnaire, with athletes also presenting a slightly higher result. The lowest result in this questionnaire means a low confidence of the participants to return to sport, and makes us take into account that psychological support can be very useful and result in better conditions for sports practice and even in the competitive level presented by the individual, as well as as the prevention of future injuries that the individual may suffer.

REFERENCES

I. ARAUJO, F. E. D. S. ATUAÇÃO DA FISIOTERAPIA NO PÓS - OPERATÓRIO DE LIGAMENTO CRUZADO ANTERIOR. [s.l.] Pitágoras, 2019.

II. ARLIANI, G. G.; PEREIRA, V. L.; LEÃO, R. G.; LARA, P. S.; EJNISMAN, B.; COHEN, M. Tratamento das lesões do ligamento cruzado anterior em jogadores profissionais de futebol por cirurgiões ortopedistas. Revista Brasileira de Ortopedia, v. 54, n. 06, p. 703–708, 13 dez. 2019.

III. ATTARD, S.; CASTILLO, J.; ZARB, F. Establishment of image quality for MRI of the knee joint using a list of anatomical criteria. Radiography, v. 24, n. 3, p. 196–203, 2018.

IV. CARDOSO, V.; TREVISAN, I.; CICOLELLA, D. DE A.; WATERKEMPER, R. Revisão sistemática de métodos mistos: método de pesquisa para a incorporação de evidências na enfermagem. Texto & Contexto-Enfermagem, v. 28, 2019.

V. COSTA, M. R. DE C. D. I Congresso de Ortopedia e Terapia Manual; II Simpósio Sergipano de Fisioterapia Ortopédica e Manual. 2019.

VI. COUTINHO, J. J. F.; DE LIMA, Y. R. S.; GONÇALVES, M. A. N. B. CAPÍTULO 06 Análise Ergonômica e as Atribuições do Fisioterapeuta na Empresa. Coletânea de Trabalhos Acadêmicos: 30 Anos do Curso de Fisioterapia da UNIC, p. 63, [s.d.].

VII. CZARNOWSKI, J. Strength testing based automatic scaling of muscle-tendon parameters for musculoskeletal models: An automated method of scaling subject specific muscle-tendon parameters of thigh muscles, 2022.

VIII. DE SÁ, D. C.; DE MATOS SILVA, A. S.; DA SILVA, D. A.; SALDANHA, A. B. R.; CARDOSO, L. F. N.; JOIA, L. C. Benefícios da hidroterapia na reabilitação das lesões do joelho: Uma revisão bibliográfica. HÍGIA-REVISTA DE CIÊNCIAS DA SAÚDE E SOCIAIS APLICADAS DO OESTE BAIANO, v. 4, n. 1, 2019.

IX. DE SOUZA LEÃO, M. G.; NUNES, J. C.; DA COSTA, I. T.; PERFEITO, S. A. B.; DE PAULA ROGÉRIO, W.; BRASIL, R.; NUNES, S. Avaliação da adição da epinefrina à bupivacaína intra-articular no controle da dor aguda em pacientes submetidos a reconstrução do ligamento cruzado anterior Ã. 2021.

X. FLEMING, J. D.; RITZMANN, R.; CENTNER, C. Effect of an anterior cruciate ligament rupture on knee proprioception within 2 Years after conservative and operative treatment: A systematic review with meta-analysis. Sports Medicine, p. 1–12, 2022.

XI. FONSECA, R. C. V. DA. Metodologia do Trabalho Científico. 1. ed. Curitiba: [s.n.].

XII. INNOCENTI, B.; ARMILLOTTA, N. Design and validation of a workbench for knee joint biomechanical analysis. 2020.

XIII. MARQUES, J. P. S. Índices de confiança na retoma desportiva após lesão do ligamento cruzado anterior, 2016.

XIV. RODRIGUES, C. A. S.; ALMEIDA, G. P. L.; LIMA, P. O. DE P. Variáveis biomecânicas que interferem na performance do Y-Balance Test e Biodex Balance Test. 2017.

XV. SILVA, G. P. DA. Desenho de pesquisa. 2018.

XVI. SILVA JÚNIOR, O. DE M.; OHASHI, B. DO N.; ALMEIDA, M. O. DE; GONÇALVES, M. R. Resultado funcional relacionado ao posicionamento do enxerto na reconstrução do ligamento cruzado anterior. Revista Brasileira de Ortopedia, v. 50, p. 57–67, 2015.

XVII. SILVA, M. S.; JÓRIO MACHADO, D. DE M. C. ATUAÇÃO DA FISIOTERAPIA NO PÓS-OPERATÓRIO DE LIGAMENTO CRUZADO ANTERIOR EM ATLETAS: REVISÃO INTEGRATIVA. 2022.

XVIII. SILVEIRA, T. E. G. D. T. Métodos de Pesquisa. 1. ed. Porto Alegre: [s.n.].

XIX. SOARES, A. C.; DE SOUZA, M. S. A.; DE SOUZA, M. R.; ROCHA, J. N. F. QUALIDADE DE VIDA E CAPACIDADE FUNCIONAL NO PÓS-OPERATÓRIO TARDIO DE LIGAMENTO CRUZADO ANTERIOR EM TRABALHADORES DE UMA EMPRESA DE ENTREGA DE CORESPONDÊNCIAS. Revista Corpus Hippocraticum, v. 1, n. 1, 2017.

XX. SOUZA, E. L. DE; LYRA, C. DE O.; COSTA, N. D. L.; ROCHA, P. DE M.; UCHOA, A. DA C. Metodologia da pesquisa: aplicabilidade em trabalhos científicos na área da saúdeEDUFRN, , 2019.

XXI. TAYFUR, A.; TAYFUR, B. The Knee. In: Functional Exercise Anatomy and Physiology for

Physiotherapists. [s.l.] Springer, 2023. p. 291–314.

XXII. THOMEER, L.; GUAN, S.; GRAY, H.; SCHACHE, A.; DE STEIGER, R.; PANDY, M. Six-degree-of-freedom tibiofemoral and patellofemoral joint motion during activities of daily living. Annals of Biomedical Engineering, v. 49, n. 4, p. 1183–1198, 2021.

XXIII. TÜRCK, S. M. Relação entre a performance muscular e o desempenho funcional em atletas recreacionais submetidos à reconstrução do ligamento cruzado anterior. 2019.

XXIV. WAGHMARE, A. P. Muscle Work While Running at Different Speed. INTERNATIONAL JOURNAL OF SCIENTIFIC STUDY, v. 7, n. 12, p. 3–13, 2020.

XXV. ZAMBELLO, A. V.; SOARES, A. G.; TAUIL, C. E.; DONZELLI, C. A.; FONTANA, F.; CHOTOLLI, W. P. Metodologia da Pesquisa e do Trabalho Científico. 1. ed. Penápolis: [s.n.].