ORIGINAL ARTICLE

Impact of Kinesiophobia on ability of the athlete to return to pre-injury sports activity level: After arthroscopic anterior cruciate ligament reconstruction with hamstring tendon

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Abstract:

Objective: To study the association between fear of re-injury and ability of patient to return to their sport's activity level as they were involved before surgery.

Introduction: Complete anterior cruciate ligament rupture is the most common injury results in a mechanically unstable knee. Therefore, ACL reconstruction is highly recommended in athletes to help in restoring the knee stability for returning to contact sports. Despite marked improvement in knee stability and function, it has been observed that a large percentage of patients do not return to their pre-injury level of sports activities.

Materials and Methods: This prospective observational study was carried out at Orthopedic Department of Liaquat National Hospital and Medical College, Karachi, included 53-patients who underwent arthroscopic anterior cruciate ligament reconstruction from January 2019 to January 2021.

Results: 38 patients 79%, (as per gender difference 34 (71%) were male's and 4 (8%) were females with p value of 0.05) these patients were active in contact sports such as soccer, hockey, cricket, throw ball and badminton, and on final follow up when inquired they attained maximal level of participation in sports activity (as per before injury)

Conclusion: Fear of movement that is assumed to cause re-injury is a psychological factor, Kinesiophobia has a significant impact on one's ability to return to pre-injury activity level.

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Introduction:

Complete anterior cruciate ligament rupture is the most common injury results in a mechanically unstable knee. Therefore, Anterior cruciate ligament reconstruction is highly recommended in athletes to help in restoring the knee stability for returning to contact sports. ACL injury if remain unaddressed might result in meniscal injury.[1] Anterior cruciate ligament (ACL) injuries usually results in early end to a career in sports. It has been said that return to athletic activity can be used as an indicator of the success of Anterior cruciate ligament reconstruction (ACLR).[2,3] The long term goal of Anterior cruciate ligament reconstruction (ACLR) is to halt the progression of post-traumatic arthritis years after the initial injury.[4,5] Despite marked improvement in knee stability and function, it has been observed that a large percentage of patients do not return to their preinjury level of sports activities.[6,7] Even with high rates of rehabilitation measures, only 47% of patients return to their preinjury level of sports activities several years after primary Anterior cruciate ligament reconstruction.[8]

Many factors have been associated with the lack of the patient to return to sports after ACL reconstruction, these are post-operative limited knee function, social reasons, psychological issues such as fear of re-injury or monetary factors in professional athletes.[9] Psychological responses occur in relation to physical trauma and results in negative emotions and lack of self

confidence in most athletes.[10] A fear of re-injury plays a major confounding role in the treatment effect of reconstruction and rehabilitation.[11] A certain degree of concern regarding ACL injury after reconstruction is expected. however, increasing level of kinesiophobia is associated significantly with the lack of return to sports.[6,12] Our objective is to highlight the main factor 'fear of re-injury'and its Impact on the ability of the athelete on returning to pre-injury sports level. We hypothesized that fear on re-injury has major psychological impact.

Materials and Methods:

This study was approved by Ethics Review Committee of Liaquat National Hospital and Medical College, Karachi. The informed consent has been taken from each participant.

Study design: This prospective observational study was carried out at Orthopedic Department of Liaquat National Hospital and Medical College, Karachi, including all patients who underwent arthroscopic anterior cruciate ligament reconstruction from January 2019 to January 2021.

This study focusing on 12 months follow-up of patients who underwent anterior cruciate ligament reconstruction and association in between fear of re-injury (kinesiophobia) and returning of the athlete's to pre-injury activity level.

Inclusion criteria: Patients who underwent arthroscopic ACL reconstruction, between 18 to 50 years of age, after unilateral ACL injury, concomitant meniscal injury with no bony injury were included in this study. Patients with osteochondral defect upto grade 2 as per (International Cartilage Repair Society) ICRS grading system were also included in this study.

Exclusion criteria: Patients under 18 years or greater than 50 years of age, multi-ligamentous injuries, revision ACL surgeries, associated with bony, vascular and neurological injuries were not included in this study. Patients with osteochondral defects 3-4 as per (International Cartilage Repair Society) ICRS grading system and those were not willing to participate were excluded and those who lost to follow up (5 Patients were lost to follow up)

Sample size estimation: The purpose of this study was collect descriptive data regarding the reason for not returning to pre-injury activity level. Because there were no appropriate data to use for sample size estimation, our sample size is a result of convenient data sampling based on our sample size. Total of 48 participants with an estimation of 79% males and 21% females (38 males, 10 females) were recruited. On the basis of this size for our convenience sample, our study was adequately powered with (80% power level) to detect minimum of 10% standard deviation.

During the January 2019 to January 2021, total of 48-patients underwent ACL reconstruction at Liaquat National Hospital and Medical College. After the 12 month's follow-up the patients who met the above mentioned inclusion criteria were identified as a successful participants for this study after excluding five patients who lost to follow up.

Measures: The Tampa Scale of Kinesiophobia,[13] and a general questionnaire was used for the assessment of association between kinesiophobia and ability of the athlete to return to pre injury sports activity level. The patients who came for follow-up were asked to fill the questionnaire. Total of 48 patients were followed under study, 38 males and 10 females. All the patients had their ACL reconstructed arthroscopically using hamstring tendon. Patients were followed on regular intervals at 2 weeks, 6 weeks, 3 months, 6 months and final follow up taken on 12 months. Scores were measured at 3 months, 6 months and 12 months, after comparing all those average scores were taken and results were finalized by using Tempa scale of Kinesophobia and simple patient rated questionnaire.

Kinesiophobia is described by Miller, Kori and Todd in 1990 at the 9th Annual Scientific Meeting of the American Pain Society as a situation in which a patient has an excessive, irrational,

Table 1: Descriptive results from TSK

	Male	**Female**	**Total**
Age	31.3 (18-44)	33.6 (24-46)	31.8 (18-46)
TSK	22 + 9 (n=38)	22 + 10 (n=10)	22 + 11 (n=48)
Return to activity level	n= 34 (71%)	n=4 (8%)	n=38 (79%)

Table 2: Descriptive results from TSK

Reason	**Males** (N=4)	**Female** (N=6)	**Total**
Problem with knee function	0	3 (30%)	3 (30%)
Fear of Re-injury	4 (40%)	2 (20%)	6 (60%)
History of re-trauma	0	1 (10%)	1 (10%)

and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury.[14] leading the patient to return to pre-injury sports levels. The Tampa Scale of Kinesiophobia

The way of measuring kinesiophobiain this study is by availing the Tampa Scale for Kinesiophobia (TSK) (Miller, Kori, and Todd, 1991), which quantifies the experience for kinesiophobia. The TSK was originally outlined for the fear in the patients with chronic musculo-skeletal pain.[15] The TSK questionnaire consisting of 17 questions for measuring the grade of kinesiophobia. Each statement comprises 4 point likert scale with score of 1 (strongly disagree) to 4 (strongly agree). A total score is between minimumof 17 to maximum of 68. A high score of TSK indicates a high degree of kinesiophobia. The TSK scale used in this study was in both local and English language with the inventor permission, eventually same scoring and coding was retained. 9-statements were rephrased by the author for the feasibility for the paticipants in this study. Precisely 'my pain' was changed to my 'knee problem' in statement 2, 4, 10. The statement 3 was changed from : "my body is telling me I have something dangerously wrong" to " My mind is telling me I have something dangerously wrong with my knee." In statements 6 and 7 "my body" was changed to "my knee". In statement 15 " injured" was simply replaced by "re-injured". In statement 16 "something" was changed to "my damaged knee."

The total score of the scale range from 17- 68, where:17 means no kinesiophobia while 68 means severe kinesiophobia and cumulative score of ±37 indicates there is kinesiophobia.

In addition to the above, the general questionnaire was used in this study, which included the questions about grading the pain levels from 0 to 10, pre-injury acivity level, mechanism of injury and the reasons about whether they have achieved their activity level or not.

Descriptive data and Statisitical analysis: Linear relationship between TSK and pain at injury time and between TSK and age were analyzed using pearson gradient moment correlation coefficient. Any gender difference in role of returning to pre-injury activity was evaluated with the chi-aquare test.

The proportion of patients active in contact sports before and after surgery was evaluated for significance using the chi-square test any difference in TSK between patients who returned to pre-injury activity and the patients who did not was evaluated with the unpaired t-test. The statistical system package (statSoft Inc, USA) was used for all statistical testing.

Results:

38 patients 79%, (as per gender difference 34 (71%) were male's and 4(8%) were females with p value of 0.05) these patients were active in contact sports such as soccer, hockey, cricket, throw ball and badminton, and on final follow up when inquired they attained maximal level of participation in sports activity (as per before injury)

However, 10 athletes (20.8%, 4 males and 6 females, p value less than 0.05) didn't return to pre-injury sports activity

Fear of re-injury remain the main cause in 6 athletes (4 males and 2 females) for not returning back to pre-injury activity.

10 patients who didn't return to their pre-injury activity level as shown in table-2.

Fear of re-injury (kinesiophobia) impact on the ability of the athelete on returning to pre-injury sports level

	Questionnaire
1	Name:
2	Age:
3	Gender: male /female
4	How does you rate your level of pain?
5	From 0 to 10 (0 is lowest and 10 is highest)
6	Mechanism of injury:
7	a) Direct blow to knee, b) Twisting injury, c) RTA, d) Unknown
8	What was your pre-injury activity level?
9	a) Vigourous, b) Moderate, c) Light, d) Sedentary
10	Have you achieved pre-injury activity level:
11	If yes, How?
12	a) Satisfied with surgey, b) Good rehabilitation therapy, c) Self belief (confidence to return to activity level), d) profession necessasity
13	If no, Why?
14	a) Not satisfied with treatment, b)Fear of reinjury, c)Pain during Rehabilitation, d) Loss of interest, e) Belief that patient cannot return to pre-injury activity level, f) Constant

Tampa Scale for Kinesiophobia (Miller , Kori and Todd 1991)
1= strongly disagree 2= disagree 3= agree 4= strongly agree

1	I'm afraid that I might injury myself if I exercise	1	2	3	4
2	If I were to try to overcome my knee problem, it may aggravate	1	2	3	4
3	My mindis telling me I have something dangerously wrong with my knee	1	2	3	4
4	My knee problem would probably be relieved if I were to exercise	1	2	3	4
5	People aren't taking my medical condition seriously enough	1	2	3	4
6	My accident has put my knee at risk for the rest of my life	1	2	3	4
7	Pain always means I have injured my knee	1	2	3	4
8	Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9	I am afraid that I might injure myself accidentally	1	2	3	4
10	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent knee problem from worsening	1	2	3	4
11	I wouldn't have this much pain if there weren't something potentially dangerous going on in my knee	1	2	3	4
12	Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13	Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15	I can't do all the things normal people do because it's too easy for me to get re-injured	1	2	3	4
16	Even though my damaged knee is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17	No one should have to exercise when he/she is in pain	1	2	3	4

Discussion:

An impression from the past that the pain would be an important factor causing fear of re-injury. However the study conducted by Vlayen et al, who assessed the patients with chronic low back pain by using TSK and found that there is a weak relation between pain and fear of re-injury due to movement.[13]

According to a study conducted in Sweden, 53% of the patients had achieved pre-injury activity level in the duration of 3 to 4 years after their ACL reconstruction. Furthermore, rate of returning to contact sports were lower in those patients. In 24% of the patients, fear of re-injury was the main factor for not returning to their pre-injury sports activity level.[16]

Some authors mentioned that fear of re-injury is the main factor for the failure to return to pre-injury sports activity level and that fear was calculated using TSK questionnaire.[9,17,18]

Initially, Kori et al, used TSK scale for the assessment of musculo-skeletal pain, furthermore the patients who overcome their fear of re-injury were most likely to return to their pre-injury activity level, compared to the patients who did not confront their fear.[19] Therefore, during rehabilitation main focus should be on to overcome the psychological aspects of the injury.

The objective of our study is to highlight the importance of psychological role, when a person experiences a trauma it triggers a emotional response and has a negative effect on mental health. There is evidence in literature which suggests that negative impact on one's mental health it affects the outcomes of rehabilitation process[20] while positive mental health increase the outcomes of rehabilitation of the individual.

Fear of Re-injury during rehabilitation process interferes with patient quality of life and functional activities which may affects one's ability to return to field and participate in on ground sports activities. However, the importance of psychological impact of Fear of Re injury during rehabilitation and evaluation after ACL re-

construction is not fully understood yet. Further studies on psychological and functional variables are required to fully understand the impact of fear of re-injury.

Conclusion:
In this limited short term follow up study we conclude that Kinesiophobia (Fear of Re-Injury) has a significant impact on one's ability to return to pre-injury activity level and therefore we recommend constant motivation and good rehabilitation after surgery to have maximum outcome.

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Role and contribution of authors:
Usman Mehmood, Conception, manuscript writing and Study Design,

Arslan Ahmed Abro, Literature review and manuscript writing

Muhammad Sufyan, Proof Reading and data analysis

Muhammmad Kazim Rahim Najjad, Analysis and interpretation of data

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References:
1. Caborn DN, Johnson BM. The natural history of the anterior cruciate ligament-deficient knee. A review. Clinics in sports medicine. 1993 Oct;12(4):625-36.
2. Bak K, Jørgensen U, Ekstrand J, Scavenius M. Results of reconstruction of acute ruptures of the anterior cruciate ligament with an iliotibial band autograft. Knee Surgery, Sports Traumatology, Arthroscopy. 1999 Mar 1;7(2):111-7.
3. Deehan DJ, Salmon LJ, Webb VJ, Davies A, Pinczewski LA. Endoscopic reconstruction of the anterior cruciate ligament with an ipsilateral patellar tendon autograft: a prospective longitudinal five-year study. The Journal of bone and joint surgery. British volume. 2000 Sep;82(7):984-91.
4. Lohmander LS, Östenberg A, Englund M, Roos H. High prevalence of knee osteoarthritis, pain, and functional limitations in female soccer players twelve years after anterior cruciate ligament injury. Arthritis & Rheumatism: Official Journal of the American College of Rheumatology. 2004 Oct;50(10):3145-52.
5. Biswal S, Hastie T, Andriacchi TP, Bergman GA, Dillingham MF, Lang P. Risk factors for progressive cartilage loss in the knee: a longitudinal magnetic resonance imaging study in forty-three patients. Arthritis & Rheumatism: Official Journal of the American College of Rheumatology. 2002 Nov;46(11):2884-92.
6. Ardern CL, Taylor NF, Feller JA, Webster KE. Return-to-sport outcomes at 2 to 7 years after anterior cruciate ligament reconstruction surgery. The American journal of sports medicine. 2012 Jan;40(1):41-8.
7. Linschoten NJ, Johnson CA. Arthroscopic debridement of knee joint arthritis: effect of advancing articular degeneration. Journal of the Southern Orthopaedic Association. 1997;6(1):25-36.
8. Ardern CL, Webster KE, Taylor NF, Feller JA. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. Br J Sports Med. 2011 Jun 1;45(7):596-606.
9. Kvist J. Rehabilitation following anterior cruciate ligament injury. Sports Medicine. 2004 Apr 1;34(4):269-80.
10. Johnson U. Coping strategies among long-term injured competitive athletes. A study of 81 men and women in team and individual sports. Scandinavian journal of medicine & science in sports. 1997 Dec;7(6):367-72.
11. Kvist J, Ek A, Sporrstedt K, Good L. Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction. Knee surgery, sports traumatology, arthroscopy. 2005 Jul 1;13(5):393-7.
12. Ardern CL, Taylor NF, Feller JA, Webster KE. Fear of re-injury in people who have returned to sport following anterior cruciate ligament reconstruction surgery. Journal of Science and Medicine in Sport. 2012 Nov 1;15(6):488-95.
13. Vlaeyen JW, Kole-Snijders AM, Boeren RG, van Eek H (1995) Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. Pain 62(3):363–372
14. Miller RP, Kori S, Todd D. The Tampa Scale: a measure of kinesiophobia. Clin J Pain. 1991;7(1):51–52.
15. Lundberg M, Styf J, Jansson B. On what patients does the Tampa Scale for Kinesiophobia fit? Physiotherapy Theory and Practice. 2009;25(7):495–506.
16. Kvist, J., Ek, A., Sporrstedt, K. et al. Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction. Knee Surg Sports TraumatolArthrosc 13, 393–397 (2005)
17. Bjordal JM, Arnly F, Hannestad B, Strand T (1997) Epidemiology of anterior cruciate ligament injuries in soccer. Am J Sports Med 25(3):341–345
18. Mikkelsen C, Werner S, Eriksson E (2000) Closed kinetic chain alone compared to combined open and closed kinetic chain exercises for quadriceps strengthening after anterior cruciate ligament reconstruction with respect to return to sports: a prospective matched follow-up study. Knee Surg Sports TraumatolArthrosc 8(6):337–342
19. Kori SH, Miller RP, Todd DD (1990) Kinisophobia: a new view of chronic pain behavior. Pain Manag (Januari/Februari):35–43
20. Bruijning JE, van Rens GH, Fick M, Knol DL, van Nispen RM. Longitudinal observation, evaluation and interpretation of coping with mental (emotional) health in low vision rehabilitation using the Dutch ICF Activity Inventory. Health and quality of life outcomes. 2014 Dec;12(1):1-6.