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### EFFECTIVENESS OF PROPRIOCEPTIVE EXERCISE ON JOINT POSITION SENSE AND QUALITY OF LIFE IN POST ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION SUBJECTS

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**Abstract:** To find out the effect of proprioceptive exercises on joint position sense and quality of life in post ACL reconstruction subjects. **PATIENT AND METHODS:** Totally 30 subjects were taken as experiment treat with proprioceptive exercise. The subjects were selected according to inclusion and exclusion criteria. Then pre participation data will be collected from all the selected subjects with complete evaluation of joint position sense through non-weight bearing joint reposition sense test and quality of life using international knee documentation score (IKDS) after the 3<sup>rd</sup> day of the post ACL reconstruction .after tacking the pre values start the proprioceptive protocol exercise for six weeks .After the six weeks of protocol than we will take the post values of joint position sense and quality of life. **RESULT:** There is a statistically significant ( $p<.000$ ) improvement of the proprioception with the six weeks protocol proprioceptive exercise. It shows highly significant values in all parameters. **Conclusion:** The proprioception training program improve joint position sense and quality of life .Therefore proprioception training intervention is effective in enhancing quality of life.

**Keywords:** Exercise, Joint Position, Sense, Ligament



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## INTRODUCTION

Anterior cruciate ligament (ACL) is a joint intra articular, extra synovial structure. It attaches from the anterior and lateral to the tibia and insert into the posterior medial aspect lateral femoral condyles the main function of the ACL to maintain stability of the knee joint. Stability more in the anterior to knee 86% force stabilizing against anterior displacement of tibia. The anterior cruciate ligament may also be consists of two separates bundles anteromedial bundle (AMB) and posteriolateral bundle (PLB) that wrap around each other as the knee flexes. The anteromedial bundle (AMB) and posteriolateral bundle (PLB) are named for their tibial insertion and have slight different functions. However is attributed to either the anteromedial bundle and posteriolateral bundle with the knee close to full extension, the posteriolateral bundle is taut. As the knee flexes, however, the posteriolateral bundle looses and the anteromedial bundle become tight.

Injury to the joint structure such as ACL it can damage the mechanoreceptors. the following damage of afferent pathway and CNS transmission of information result in the disturbing joint position sense and kinaesthesia. In ACL injures many studies are done on the joint range of motion and muscular strength but only few studies are done to improve the proprioception of knee after the ACL injury the reconstruction of the ACL can be achieved successfully by a Variety of procedures but many authors have reported poor correlation between the clinical signs knee assessment score and function. Some patient who have persistent ligamentous laxity after the reconstruction return to full activity without symptoms. The pattern of proprioception recovery after the ACL reconstruction is still not clear. therefore the loss of proprioception after the ACL reconstruction needs to be analysed. Hence the aim of the study is to find out the influence of proprioceptive exercise on joint position sense and quality of life in post ACL reconstruction surgery individuals.

## AIM OF THE STUDY

To find out the effect of proprioceptive exercises on joint position sense and quality of life in post ACL reconstruction subjects

## NEED OF THE STUDY

Many studies was done on influence of physiotherapy after ACL reconstruction. They concentration on the joint range of motions and improve the muscle strength. But after the ACL reconstruction surgery proprioception of the joint is altered so that the study is taken for the research. There are very few studies done on the proprioceptive training in ACL reconstruction. Hence this study is designed to find out the effect of proprioceptive exercises on joint position sense and quality of life after ACL reconstruction surgery.

## OBJECTIVES OF THE STUDY

To evaluate the effect of proprioceptive exercise on joint position sense using non-weight bearing joint reposition sense test (NWJPS) in ACL reconstruction subjects.

To evaluate the effect of proprioceptive exercises on quality of life using international knee documentation score (IDKS) in ACL reconstruction subjects.

## MATERIALS AND METHODOLOGY

After reviewing the problem of ACL reconstruction, review of literature, aim and objectives let us discuss the materials and methodology of the present study.

### MATERIALS

- Goniometry
- Treatment table
- international knee documentation score(IDKS) questionnaire

### STUDY SETUP

Thirty patients with age between 20 to 35 years individuals who were diagnosed as ACL tear and underwent surgery of ACL reconstruction in BIRRD, and who came to collage of physiotherapy, tirupathi, Andhra Pradesh were taken up for the study.

### STUDY PERIOD AND STUDY DESIGN

The study design adopted for the study is quasi experimental design, selection of sample, the hospital investigations, data recording etc ... were conducted during a period of 6 weeks from the 3rd day of the post ACL reconstruction.

### STUDY SUBJECTS

#### INCLUSIVE CRITERIA

- 20 – 35 years age group.
- Both genders.
- ACL injury with post ACL reconstruction surgery.

#### EXCLUSIVE CRITERIA

- Meniscus injury.
- Fracture around knee.
- Previous injury around the knee.
- Intra articular injection in to the knee.
- Joint effusion to knee.
- Osteoarthritis of knee
- Joint infection.
- Other Ligaments injuries around the knee

**Sampling method:-** In quasi experimental design 30 subjects who met the inclusive criteria were included in the study . Before study, subjects completed several self report outcome measures.non weight bearing joint reposition sense used to level of joint position sense in pre and post values of post ACL reconstruction measures has taken. international knee documentation score (IDKS) is used to measure the quality of life both pre and post values taken.

#### **METHODOLOGY:**

A total thirty samples were collected who are underwent post ACL reconstruction .

- **Sampling:** - purposive sampling.
- **Sample size:** - 30 samples.
- **Study duration:** - 6 weeks.
- **Sessions:-** 3 sessions alternate days in a week

#### **INTERVENTION PROTOCOL:**

##### **1 and 2<sup>nd</sup> week**

1. One leg balance
2. Forward –backward leg swings with knee flexed
3. Forward-backward leg swing with knee extended
4. Toe walking

5. Heel walking
6. Cross body swings.

### **3<sup>rd</sup> and 4<sup>th</sup> week**

1. Advanced one leg balance
2. Maximum forward backward leg swings with knee extended
3. Toe walking as before, but now pick up the pace
4. Heel walking .use the earlier moves, but walk very quickly
5. One leg squats.
6. Runners poses
7. Bicycle leg swings without resistance

### **5<sup>th</sup> and 6<sup>th</sup> week**

1. Blind advanced one leg balances
2. Bicycle leg swings with resistance
3. Partial squats
4. Toe skipping
5. Heel skipping
6. High-bench steps-ups.

### **PROCEDURE**

As my study was done at BIRRD hospital and collage of physiotherapy for the purpose of the study .i had chosen 30 subjects who underwent post anterior cruciate ligament reconstruction. The subjects were include in this project .the prior informed consent will be obtained from all participants form all participates after fully explaining the procedure.

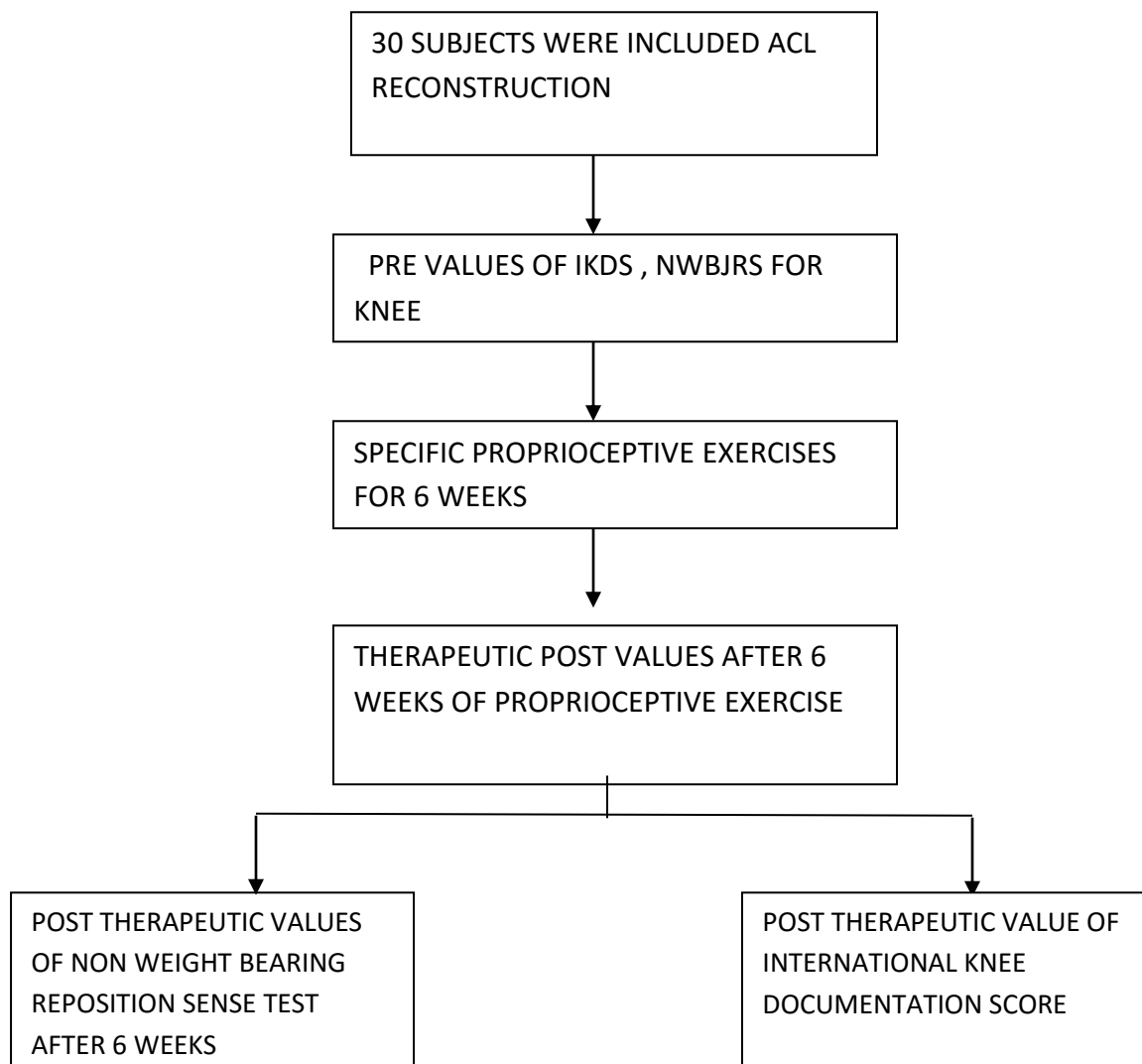
30 were are taken as experimental group treated with proprioceptive execerise. The subjects were selected according to inclusion and exclusion criteria . then pre participation data will be collected from all the selected subjects with complete evaluation of joint position sense through non weight bearing joint reposition sense test and quality of life using international

knee documentation score (IKDS) after the 3<sup>rd</sup> day of the post ACL reconstruction subjects .After that above table 1 intervention given for six weeks .

After six weeks we taken post values collected from all the participate with complete evaluation of evaluation of joint position sense through non weight bearing joint reposition sense test and quality of life using international knee documentation score (IKDS) .

## METHODOLOGY

### STUDY ALGORITHM

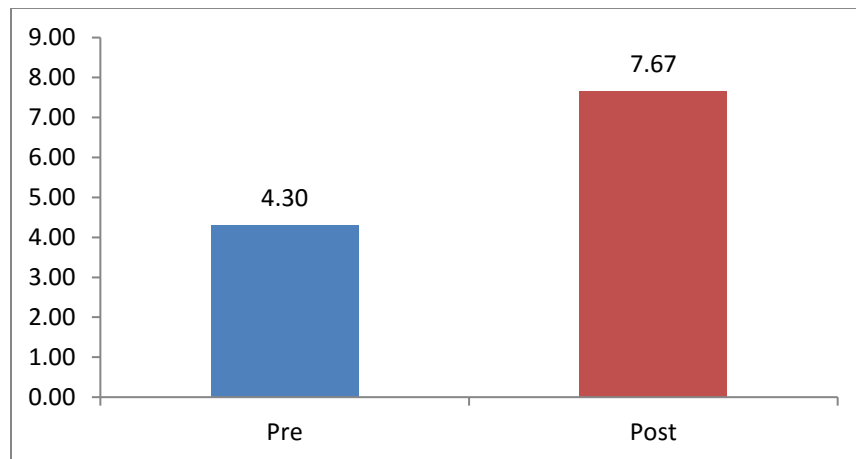


**RESULT**

		N	Mean	SD	Std. Error	df	t-value	p-value	Remarks
JPS	Pre	30	4.30	1.022	0.187	29	20.721	0.000	As p < 0.05, there is significant difference between the pre and post within JPS
	Post	30	7.67	1.124	0.205				
IKDS	Pre	30	38.79	3.676	0.671	29	12.642	0.000	As p < 0.05, there is significant difference between the pre and post within IKD
	Post	30	41.79	3.368	0.615				

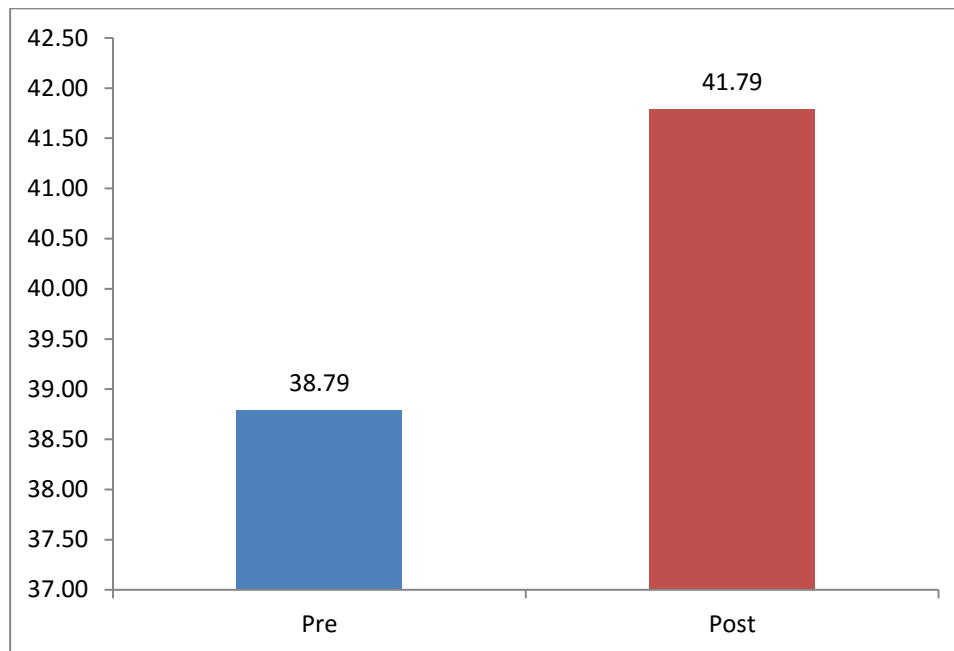
Pre and post mean and std. error values of joint position sense and quality of life which shows significant increase in post therapeutic values.

**GRAPH 1:- GRAPHICAL REPRESENTATION OF PRE AND POST MEAN VALUES OF NON WEIGHT BEARING JOINT REPOSITION TEST**



There was a significant difference between comparison of JPS means of pre and post intervention of proprioception exercise in subjects with ACL reconstruction

**GRAPH 2:- GRAPHICAL REPRESENTATION OF PRE AND POST MEAN VALUES OF IKDS:**



There was a significant difference between comparison of IKDS means of pre and post intervention of proprioception exercise in subjects with ACL reconstruction.

## **DISCUSSION**

Anterior cruciate ligament is an articular element structure of paramount importance for normal knee movement since it secure simultaneously static and dynamic stability .There are three types of mechanoreceptors by different morphological charecters two types of Ruffini end organs ,Paccinian corpuscles and smaller number of free nerve endings .

Most author refer to two types of proprioceptive sensation for clinical reasons .Static proprioceptive is defined a joint position sense that is the direction of limbs in space & perception of their interrelationship.

Dynamic proprioception kinaesthesia include the sense of limb movement and speed change, acceleration or deceleration. The injury to the ach can damage afferent pathway and CNS transmission of information resulting in disturbing joint position sense and kinaesthesia

The main goal of our study was to evaluates effectiveness of proprioceptive exercise on joint position sense and quality of life in ACL reconstruction .most previous studies have focused on motor functioning after ACL reconstruction.



'Bonfim' assessed sensory defects and their effect on proprioception and motor function in patient who had under gone ACL reconstructed .they found that a reconstruction .they found that a reconstructed knee showed decreased joint position sense.

In the present study it relevant that proprioception exercise has significant effects joint position sense and improvement of proprioceptive in the ACL reconstruction subjects.

In the present study quality of the life measured by using international knee documentation score .the subject showed significant improvement within the group pre to post intervention; and post intervention at the end of 6 weeks .statistically significance difference was found between pre and post value .

The knee joint position sense was measured by using non weight bearing joint reposition sense test .the subjects showed significant improvement in knee proprioception in both pre to post intervention and post intervention at the end of 6 weeks .statistically significance difference was found between pre and post value

## CONCLUSION

The present study was conducted to evaluated effectiveness of proprioception training program on post ACL reconstruction. Non weight bearing Joint reposition sense test and IKDC score was evaluated in prior to and after 6 weeks training program .the result of this study indicated. That a proprioception training program improve joint position sense and quality of life .therefore proprioception training intervention is effective in enhancing quality of life

In the above study alternate hypothesis is accepted ,null hypothesis is rejected .hence ,it is proved that proprioceptive training is effective in enhancing joint position sense (JPS) and quality of life In post ACL reconstruction surgery individuals.

## Limitations of the study

- Sample size was small.
- Study duration is less.
- To include outcome measure which measures balance and stability.

## RECOMMENDATIONS

- The future study is recommended with large sample size
- The future study is recommended for more than twelve weeks duration for better results.

## REFERENCES

1. J.Dargal..M.gotter.k.mader.d.penning.j.schmidt-wiethoff. Biomechanics of the anterior cruciate ligament and implication for surgical reconstrtion .strat traum limb recon.(2007)2;1-12
2. Joshua E. Aman, naveen Elangovan ,and jurgen konczak the effectiveness of proprioception training for improving motor function: a systematic review front Hum Neurosci .2014; 8: 1075
3. Gajanana prabhu,B. Effect of proprioceptive exercise training on joint reposition sense and balance of athletes with knee injury.Vol.9.no .2:89-96.2013
4. A.L.Boerboom, M.R.Huizinga,W.A.Kaan, R.E.Stewart, A.L.Hof, S.K.Bulstra,R.L.Diercks. Validation of a method to measure the proprioception of the knee. Gait and posture 28(2008)610-014.
5. Mandeep S Dhillon ,Kamal Bali,Sharad prabhakar. Proprioception in anterior cruciate ligament deficient knees and its relevance in anterior cruciate ligament reconstruction. Vol 45 (2011)294-300.
6. Antonios G Angoules the contribution of the Anterior cruciate ligament to the knee proprioception . j nov physiother 2012,2:3.
7. Sung –Hyouon Cho, Chang –Hwan Bae ,ms,Hwang–bo gak ,Effects of closed kinetic chain exercises on proprioception and functional score of the knee after anterior cruciate ligament reconstruction .. j.phys. ther.sci.25:1239-1241, 2013
8. Seide Karasel,Berrin Akpiner. Clinical and functional outcomes and proprioception after a modified accelerate rehadilitation program following anterior cruciate reconstruction with patellar tendon autograft.
9. Minwei, Yujie liu, Zhongglili, Short term effects of radiofrequency shrinkage treatment for anterior cruciate ligament relaxation on proprioception .vol.41 no.5 1586-1593 (2013)
10. Savio L-Y woo, changfu wu biomechanics and anterior cruciate ligament reconstruction.
11. Barrett Ds proprioception and function after anterior cruciate reconstruction .j Bone joint surg (br) 1991:73-b: 833-7
12. R.W.Fremerey, p.lobenoffer. proprioception after rehabilitation and reconstruction in knees with deficiency of the anterior cruciate liagment .Vol 82 –B,No,6,August 2000.
13. Aarti sareen, Laura Ritchie,Els Van Hver.anterior cruciate ligament injury. physiopedia.
14. Fatma unver Kocak,Bulent Ulkar. Effect of proprioceptive rehabilitation on postural control following anterior cruciate ligament reconstruction .J.Phys.ther.sci.22:195-202,2010.
15. The sports injury doctor fighting fit forever.20/09/2015.
16. Move the physio way: anterior cruciate ligament –biomechanics and pathomechanics . 3/16/2016.
17. Elanchezhian chinnavan, sathish Gopaladhas.effectiveness of proprioception training in grade -2 acute anterior cruciate ligament injury in athletes.
18. John Maguire. Mervyn J Cross. Anterior cruciate ligament Pathology

19. Miyasaka KC, Daniel DM, Stone ML. The incidence of knee ligament injuries in the general population. *Am J Knee Surg* 1991;4:43-48
20. Griffin LY. Noncontact Anterior Cruciate Ligament Injuries: Risk Factors and Prevention Strategies. *J Am Acad Orthop Su* 2000;8:141-150.
21. Cynthia C Norkin, Joint Structure And Function A Comprehensive Analysis.
22. Yasuharu Negano, Hirofumiajda, Masmi Akai. Biomechanical Characteristic Of The Knee Joint In Females Athletes During Tasks Associated With Anterior Cruciate Ligament Reconstruction *Knee* 2009;153-158.
23. R. I. cooper, N. f. Taylor, j. a. feller a randomized controlled trial of proprioceptive and balance training after surgical reconstruction of the anterior cruciate ligament. *Research in Sports Medicine*, 13: 217–230, 20.
24. David Roberts, Knee joint proprioception in ACL-deficient knees is related to cartilage injury, laxity and age A retrospective study of 54 patients. 08 Jul 2009.
25. Jensen, T. fisher-rasmussen, and S.p. magnusson proprioception in poor and well functioning anterior cruciate ligament deficient patients. *J Rehabil med* 2002;34: 141-149.
26. Angelica Castilho Alonso, Julia maria D'Andrea Greve , techniques of proprioceptive evaluation of the anterior cruciate knee ligament . september 2010.
27. Stephanie Geeurickx , Kevin campion , Aarti sareen, physiopeedia , universal access to physiotherapy knowledge . 4/28/2016.
28. Sung –Hyouon Cho, Chang-Hwan Bae , Hwang-Bo Gak, effects of closed kinanetic chain exercises on proprioception and functional score of the knee after anterior cruciate ligament reconstruction. *J.phys.ther.sci.* 25:1239-1241, 2013.
29. John Maguire, Anterior Cruciate Ligament Pathology: Background, History of the Procedure, *Problem med scape* , 4/27/2016
30. Dr P.S. Bajaj Sports Arthroscopy India :: ACL Reconstrucution, Acl injury, Arthroscopy New Delhi India, Physiotherapy Centre India 4/27/2016.
31. Anterior Cruciate Ligament Surgery India, Cost Anterior Cruciate Ligament Surgery. Orthopedic Surgery
32. Jesse C. Christensen, Laura R. Goldfine, and Hugh S. West et., al, The Effects of Early Aggressive Rehabilitation on Outcomes After Anterior Cruciate Ligament Reconstruction Using Autologous Hamstring Tendon: A Randomized Clinical Trial *Journal of Sport Rehabilitation*, 2013, 22, 191-201.
33. Mohammed Salem Alhajaya et., al., Effects of proprioception training on knee joint position sense in male soccer athletes *Journal of Sociological Research* ISSN 1948-5468 2015, Vol. 6, No. 1.

34. Gholam A. Ghasemi<sup>1</sup>, Vahid Zolaktaf , Khosravi Ibrahim, Minasian V<sup>1</sup>et., al Evaluation of Joint Position Sense after ACL Reconstruction with Hamstring Tendon Auto Graft . American Journal of Sports Science and Medicine, 2013, Vol. 1, No. 3, 52-55.
35. S M Mir, M-R Hadian, S Talebian, N Nasser et., al, Functional assesment of knee joint position sense following anterior cruciate ligament reconstruction July 22, 2016 - Published by group.bmj.com.
36. Joshua M. Drouin, Peggy A. Houglum, David H. Perrin, and Bruce M. Gansneder et.,al, Weight-Bearing and Non-Weight-Bearing Knee-Joint Reposition Sense and Functional Performance. Journal of Sport Rehabilitation, 12:54-66.
37. RW Wright<sup>1</sup>, KP Spindler<sup>2</sup>, LJ Huston<sup>2</sup>, A Amendola<sup>3</sup> et., al Revision ACL Reconstruction Outcomes - MOON Cohort. J Knee Surg. 2011 December ; 24(4): 289–294.
38. Diana M. Hopper, PhD, Mia J. Creagh, et.,al., Functional Measurement of Knee Joint Position Sense After Anterior Cruciate Ligament Reconstruction