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Evaluation of Self-Efficacy, Physical Activity Participation and Return to Sports for an ACL Injury in Indian Male Athletes

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ABSTRACT

Self-efficacy refers to an individual's confidence in his or her ability to perform a specific task or behavior to achieve the successful completion of a desired outcome1.

According to Bandura theory, efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active efforts.

Self-efficacy expectations vary on several dimensions they differ in magnitude, generality and strength[2]

Self-efficacy in subjects with ACL injury measured by instrument K-SES is found reliable and valid so, It makes easier to study the responsiveness of the K-SES and various aspects of self-efficacy in the ACL population[3].

The original K-SES is used to identify patients with high self-efficacy as well as subjects with low self-efficacy from early after ACL injury and ACL reconstruction up to 12 months thereafter4.The anterior cruciate ligament (ACL) is officially injured during sports activities, mostly after jumping, changing direction, running, sudden stoppage and overextended of lower leg5.Adolescent age group affects more and increases the incidence rate of ACL Injury[7].

According to Bandura (1986) and researchers have shown that self-efficacy is a key internal motivational process that can be affected by personal and environmental variables it inflences motivational outcomes of choices efforts and goals10.

The psychosocial factors include cognitive, affective and behavioral factors which play important roles in the recovery from an ACL injury so, all three factors are particularly important for roles in the outcome of the injury. these three factors have several components like interpretations, appraisals and beliefs that come under cognition, it concerns the conscious assessments athletes make after an injury. affective factors include emotions, feelings and mood disturbances. furthermore, the behavior of the athletes refers to someone's effort, actions, and activities about an injury9.

After the injury, athletes usually report anger, depression, anxiety, a lack of confidence and fear of sustaining a reinjury so, there is evidence that these psychological disturbances may affect recovery and returning to sport and also increase the risk of sustaining a reinjury6. For example, after injury recreational athletes were found to experience lower mood disturbances than competitive athletes and were slower to recover psychosocially8.

Recovery after sports injury is influenced not only by physical factors but also by psychological factors. Therefore, successfully transition back to the sport after injury Athletes need to be physically as well as psychologically ready6. It means for return to sports both factors are important physical as well as psychological factors.

The most common psychological issues athletes face is fear of reinjury, concerns about the inability to perform at the previous level, feelings of isolation, lack of athletic identity, insufficient social support, and pressure to return to sport and this puts negative influences on the rehabilitation of an ACL injury. ACL rehabilitation requires a minimum of 6 months of physical therapy before returning to sport8.

Patients' positive psychological responses are more likely to have better rehabilitation outcomes, as having less fear and anxiety is positively correlated to returning to sport7.Apply self-efficacy education and its role on rehabilitation in improving physical activity participation and return to sports if some differences seen in grade 2 and grade 3 of 2 and 3 months respectively.To find out the subject’s self-efficacy at grade 2 (2 and 3 months) and grade 3 (2 and 3 months) of ACL injury and find out correlation the K-SES with the subjective scales including physical activity, age and return to sport.

HYPOTHESIS

ALTERNATE HYPOTHESIS

Self-efficacy, physical activity participation and return to sport for an ACL injury in Indian male athletes show significance.

NULL HYPOTHESIS

Self-efficacy, physical activity participation and return to sport for an ACL injury in Indian male athletes does not show significance.

SAMPLE SIZE

NUMBER OF SUBJECTS: - 50

SOURCES OF SUBJECTS

Pavilion ground Dehradun and Maharana Pratap sports college Dehradun.

STUDY DESIGN: - Cohort study.

SAMPLING METHOD

Judgmental or purposive sampling

CRITERIA

INCLUSION CRITERIA

Suspected ACL injury and ACL deficient,16-35 years of age athlete, Injured before one or two months before, Able to read and understand the English language, Unilateral ACL injury, Grade 2 and Grade 3 of ACL injury confirmed by consulted doctor through MRI

EXCLUSION CRITERIA

Bilateral ACL injury, Previous ACL surgery, Cartilage Injury requiring surgery, Multiple ligament reconstruction, Questionnaire data were incomplete, ACL reconstruction.

OUTCOME MEASURES

Knee pain, Physical activity, Knee function, Knee symptoms, Self-efficacy, Daily activities, Quality of life, Psychological readiness to return to sport.

OPERATIONAL DEFINITION

SELF-EFFICACY

Self-efficacy refers to confidence in one's abilities to successfully perform a particular behavior. Self-efficacy was introduced in 1977 by Albert Bandura11.

PHYSICAL ACTIVITY

WHO defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity refers to all movement including during leisure time, for transport to get to and from places, or as part of a person's work12.

ACL INJURY

An ACL injury was defined as a partial or complete rupture of the ligament that occur for the first time or as a recurrence. The ligament injury could occur in isolation or in combination with another knee joint injuries13.

REVIEW OF LITERATURE

(2019) Takuya kitaguchi et al in their study "Importance of functional performance and psychological readiness for return to preinjury level of sports 1 years after ACL reconstruction in competitive athletes" concluded that in competitive athletes, SLH<81% and ACL-RSI<55points at 6 months after surgery were associated with a greater risk of unsuccessful RTS at 1 year after surgery. SLH and ACL-RSI at 6 months could serve as screening tools to identify athletes who have difficulties with returning to sports after ACL reconstruction.

(2021) Christopher kuenze et al in their study "Assessing physical activity after ACL injury: Moving beyond return to sport"concluded that in clinicians and researchers have relied on return to sport status or self-reported PA participation via surveys. These approaches are not consistent with current recommendations for PA assessment and do not allow for comparison with contemporary PA recommendation and guidelines. Return to sport, patient reported outcome measures, and device-based assessment approaches should be used in complementary manners to comprehensively assess PA participation after ACLR. However, appropriate techniques should be used when assessing PA in adult and adolescent populations.

(2005) P. Thomeé et al in their study "A new instrument for measuring self-efficacy in patients with an anterior cruciate ligament injury" concluded that good reliability and good face, content, construct and convergent validity were demonstrated for this new instrument (K-SES) for measuring perceived self-efficacy in patients with an ACL injury. The K-SES is recommended for studied designed to evaluate

prognostic and outcome expectations of perceived self-efficacy in patients with an ACL-insufficient knee.

(2013) Roland Thomeé et al in their study "Return to sports after anterior cruciate ligament reconstruction in women" concluded that womenwho successfully returned to their pre-injury sports activity, had, in the early postoperative tests a higher physical activity, a higher physical activity, a higher goal for their future physical activity, lower pain and symptoms, better knee function, ahigher knee related quality of life and a higher LSI compared with those women that did not return.

(2007) P. Thomeé et al in their study "Self-efficacy, symptoms and physical activity in patients with an anterior cruciate ligament injury: a prospective study"concluded that K-SES has good responsiveness with significantly increased self-efficacy during the rehabilitation process for patients with an ACL-deficient knee as well as for patients who had undergone ACL reconstruction. The improvement in perceived self-efficacy could, however, only be partly explained by the improvement in subjective symptoms. Furthermore, self-efficacy differed significantly with gender, age and physical activity level early in the rehabilitation process.

(2022) Ojoawo Adesola Ojo et al in their study "Relationship among self-efficacy, physical activity and beliefs in patients with knee osteoarthritis" concluded that majority of the respondents had a high general self-efficacy. There was a significant but inverse relationship between self-efficacy and each of pain self-efficacy and belief among patients with knee osteoarthritis. (2010) Pia Thomeé et al in their study "A Randomized, controlled study of a rehabilitation model to improve knee-function self-efficacy with ACL injury"concluded that there was no evidence that the clinical rehabilitation model with strategies to enhance self-efficacy resulted in a better outcome than the rehabilitation protocol used for the control group.

(2007) Pia Thomeé et al in their study "Self-efficacy of knee function as a pre-operative predictor of outcome 1 year after anterior cruciate ligament reconstruction" concluded that patients' perceived self-efficacy of knee function pre-operatively is of predictive value for their return to acceptable levels of physical activity, symptoms and muscle function 1 year after ACL reconstruction.

(2016) Clare Ardern et al in their study "Satisfaction with knee function after primary anterior cruciate ligament reconstruction is associated with self-efficacy, quality of life, and returning to the preinjury physical activity" concluded that people who had returned to their pre-injury physical activity, and reported higher knee-related self-efficacy and quality of life were more likely to be satisfied with the outcome of ACL reconstruction.

(2019) Kate E. Webster et al in their study "Expectations for return to preinjury sport before and after anterior cruciate ligament reconstruction" concluded that patients had high expectations for returning to their preinjury level of sport at the time of undergoing initial ACLR. Expectations were lower for those who had undergone previous ACLR. Female patients and patients who had undergone previous ACLR were more likely to change their expectations and cease sport participation.These data can be used to provide patients with realistic return-to-sport expectations in the first postoperative year and highlight the challenge for patients who aim to return

from multiple ACL injuries.

PROCEDURE

Subjects of Grade 2 & Grade 3 confirmed by the MRI with ACL injury will filled Questionnaires form at 2 months and 3 months from ACL injury will be recruited from sports academy as per inclusion and exclusion criteria. Explanation will be done regarding the study. Subjects completed the six scales i.e, Marx scale, KOOS scale, K-SES scale, Lysholm scale, Tegner scale and ACL-RSI scale.

Marx scale includes 4 items: frequency of running, cutting, deceleration and pivoting subjects based on the "healthiest and most active state in the past year". It emphasizes high level knee function of functional activities. Total score is obtained by adding the individual items score range 0-16, where 0=less time in a month and 4=4 or more time in a week14.

KOOS scale assess short and long relevant outcome following knee injury. It has five outcomes: pain (5 items), symptoms (7 items), activity of daily living (17 items), sport and recreation function (5 items), and knee related quality of life (4 items), where 0=no problem and 4= extreme problem and each of the5 scores is calculated as the sum of the items included15.

K-SES scale consists of 22 items it assesses self-efficacy in daily activity (7 items), sports and leisure activities (5 items), physical activity (6 items) and knee function in future (4 items) . K-SES scale have 2 factors: 1stfactor refers self-efficacy related to present functioning and 2ndfactor refers to knee function in the future. Items are scored on an 11 points scale 0=not certain and 10= very certain16.

Tegner activity level scale describes their current activity level and that before injury. Scores varies 0-10 where, 0=sick leave or disability pension because of knee problem and 10= participation in nation and international elite competitive sports17.

Lysholm scale assess a subject knee specific symptom. Maximum score is 100 points where, 91-100 is excellent, 84-90 is good, 65-83 is fair, 64 or less is unsatisfactory17.

ACL - RSI measures psychological readiness to return to sport after an ACL injury score of each category were added and average the total score between 0 to 100 points where higher points indicates greater psychological readiness to return to sport18

Before collecting data, individual consent was taken along with demographic data.

ESTIMATED TIME NEEDED FOR DATA COLLECTION

Three Months

	Grade-2	Grade-2					
Mean Value	2 months	3 months	x-y	D	D2	V	SD
Age	19.4	19.4	0	2	0	0	0
ACL RSI	620.8	792.8	172	2	29584	1232.667	35.10935
Marx Scale	12.96	6.44	6.52	2	42.51	1.77125	1.330883
K-SES Intrument							
Daily activities	42.16	12.12	30.04	2	902.41	37.60042	6.131918
Sports & Leisure activities	6.32	4.32	2	2	4	0.166667	0.408248
Physical activities	43.76	19.32	24.44	2	597.31	24.88792	4.988779
Knee function in the future	16.6	13.6	3	2	9	0.375	0.612372
Lysholm knee Score	69.56	85.16	15.6	2	243.36	10.14	3.184337
Tegner Activity Score							
Activity level before injury	9.56	8.72	0.84	2	0.71	0.029583	0.171998
Current activity level	7	6.88	0.12	2	0.014	0.006	0.0007
KOOS							
Pain	10.52	2.72	7.8	2	60.84	2.535	1.592168
Symptom	13.08	7.84	5.24	2	27.45	1.14375	1.069462
Functional Daily Living	8.92	2.72	6.2	2	38.44	1.601667	1.26557
Function, Sports & Recreational activities	8.64	3.2	5.44	2	29.59	1.232917	1.110368
Quality of Life	7.48	3.64	3.84	2	14.74	0.614167	0.783688

Table-5.1: For Grade-2, compare in between 2 months & 3 months

	Grade-3	Grade-3					
Mean Value	2 months	3 months	x-y	D	D2	V	SD
Age	20.92	20.92	0	2	0	0	0
ACL RSI	610	707.6	97.6	2	9525.76	396.9067	19.92252
Marx Scale	6.04	8.2	2.16	2	4.67	0.194583	0.441116
K-SES Intrument							
Daily activities	51.16	45.12	6.04	2	36.48	1.52	0.073
Sports & Leisure activities	2.68	3.24	0.56	2	0.31	0.012917	0.0067
Physical activities	50.92	46.08	4.84	2	23.43	0.97625	0.988054
Knee function in the future	20.68	24.28	3.6	2	12.96	0.54	0.734847
Lysholm knee Score	54.36	35.16	19.2	2	368.64	15.36	3.919184
Tegner Activity Score							
Activity level before injury	9	8.6	0.4	2	0.16	0.006667	0.08165
Current activity level	4.2	6.48	2.28	2	5.19	0.21625	0.465027
KOOS							
Pain	13.64	12.32	1.32	2	1.74	0.0725	0.269258
Symptom	0.44	0.56	0.12	2	0.014	0.000583	0.024152
Functional Daily Living	32.32	21.96	10.36	2	107.33	4.472083	2.11473
Function, Sports & Recreational activities	15.16	13.96	1.2	2	1.44	0.06	0.244949
Quality of Life	32.32	21.96	10.36	2	107.33	4.472083	2.11473

Table-5.2: For Grade-3, compare in between 2 months & 3 months

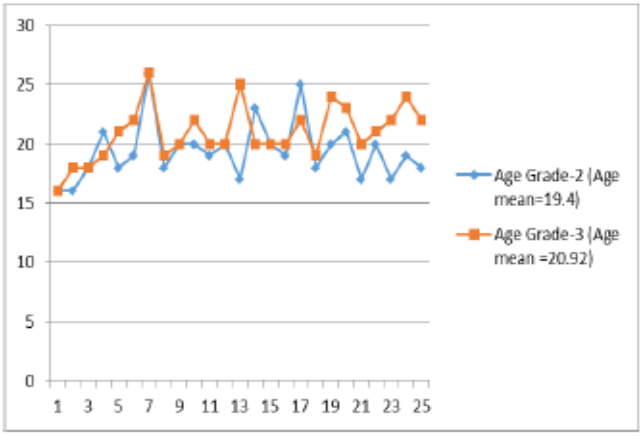
K-SES for Grade-2	2 months	3 months	M	SD	Present	SD	V
Daily activities	42.16	12.12	30.04	6.1319	2.3841	0.8859	0.7848
Sports & Leisure activities	6.32	4.32	2	0.4082			
Physical activities	43.76	19.32	24.44	4.9887			
Knee function in the future	16.6	13.6	3	0.6123			

K-SES for Grade-3	2 months	3 months	M	SD	Present	SD	V
Daily activities	51.16	45.12	6.04	0.073	0.3559	0.18947	0.03589
Sports & Leisure activities	2.68	3.24	0.56	0.0067			
Physical activities	50.92	46.08	4.84	0.588054			
Knee function in the future	20.68	24.28	3.6	0.75484			

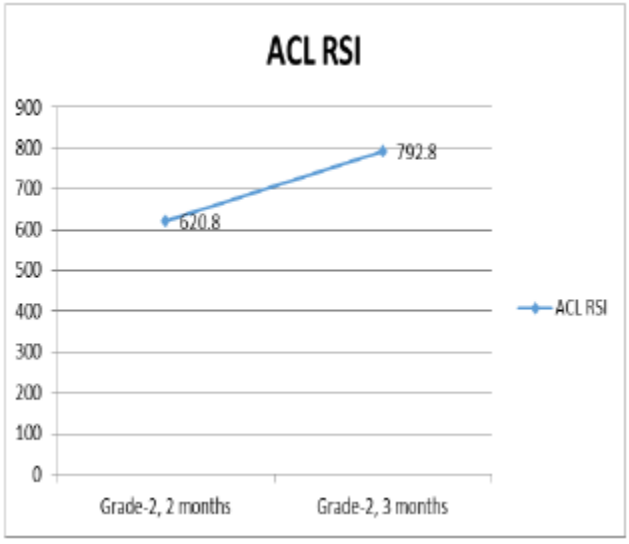
Table-5.3: Correlation in Present K-SES for grade-2 & Grade-3 (Sum of Daily activity, sport-leisure activities, Physical activities) & Future Knee function, Separately

Where V=Variance, SD=Standard Deviation

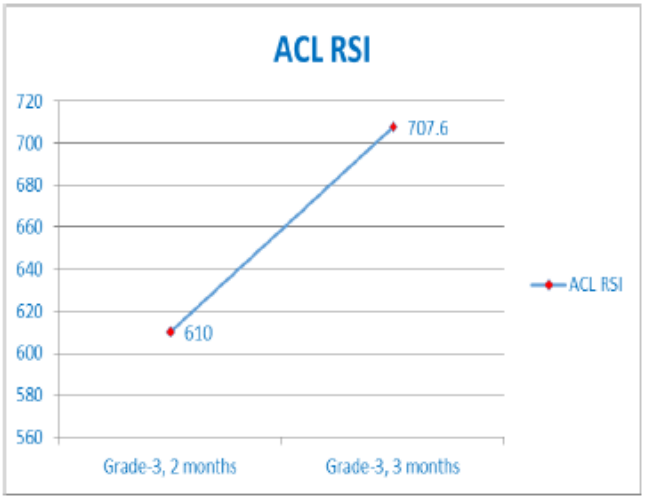
	For Grade-2	For Grade-3
A=(SD^2)/No.of n for RL	7.589926667	0.619380829
B=(SD^2)/No.of n for LL	7.113926667	0.211428686
C= A+B	14.70385333	0.830809515
D =SQRT ©	3.834560383	0.911487529
DF	28	28
t-value	0.02312319	0.084255174
p-value	0.481716012	0.433453082



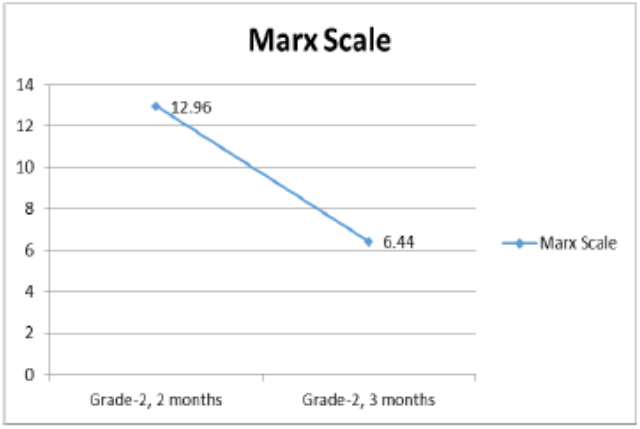
Graph-5.1: Age of all subjects of both Grade (25 each) with mean age



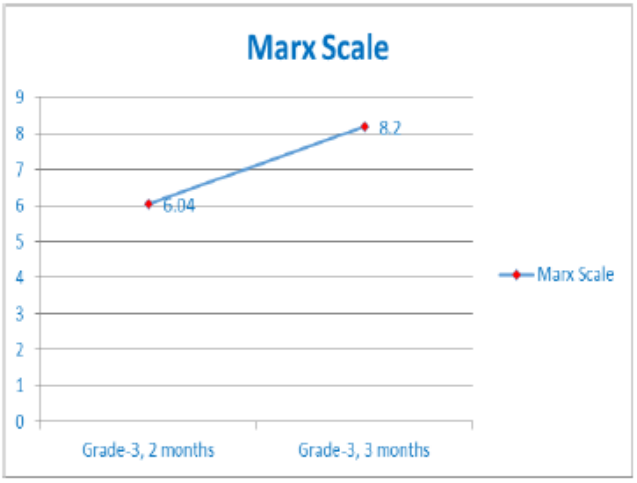
Graph-5.2: ACL RSI for Grade-2



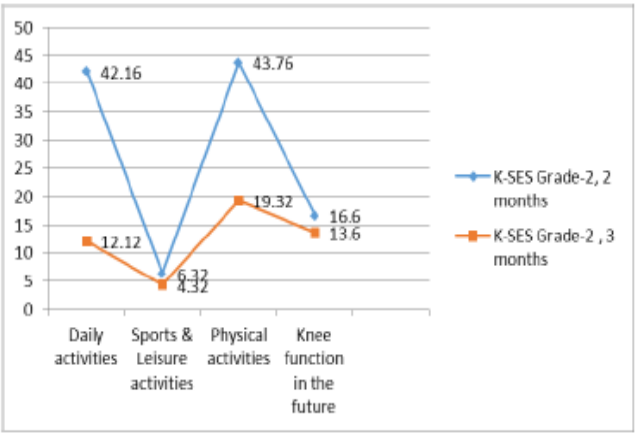
Graph-5.3: ACL RSI for Grade-3



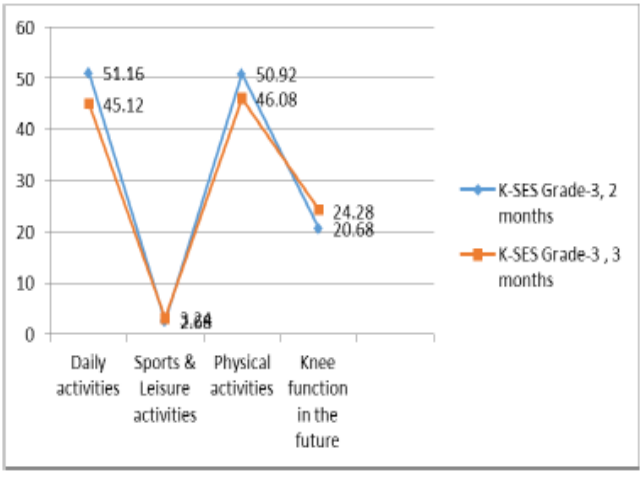
Graph-5.4: Marx Scale for Grade-2



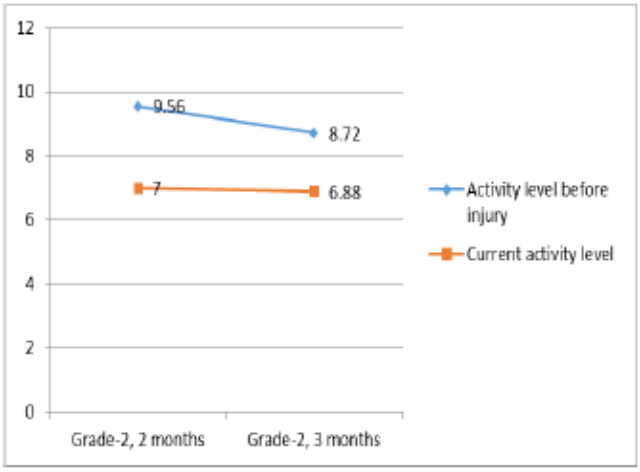
Graph-5.5: Marx Scale for Grade-3



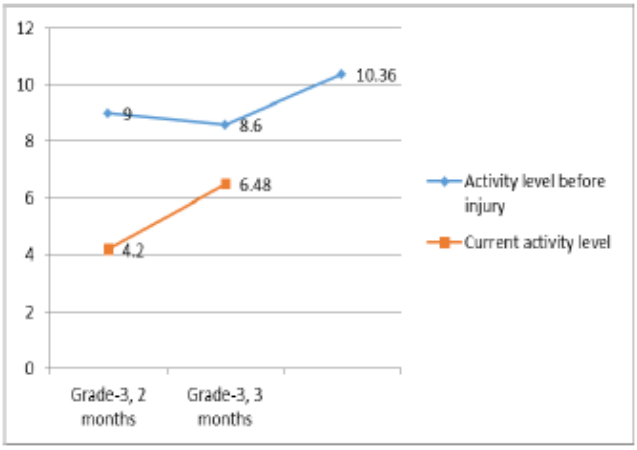
Garph-5.6: According to K-SES Instrument for Grade-2



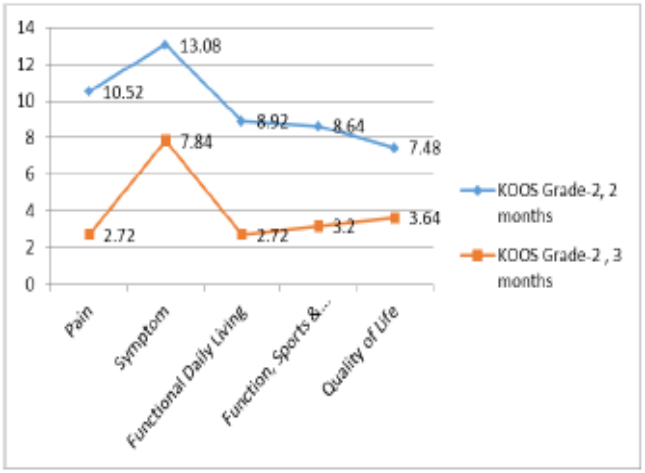
Garph-5.7: According to K-SES Instrument for Grade-3



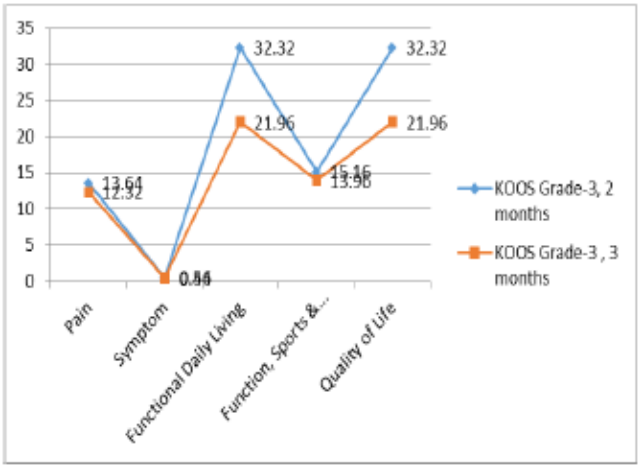
Garph-5.8: According to Tegner Activity Score for Grade-2



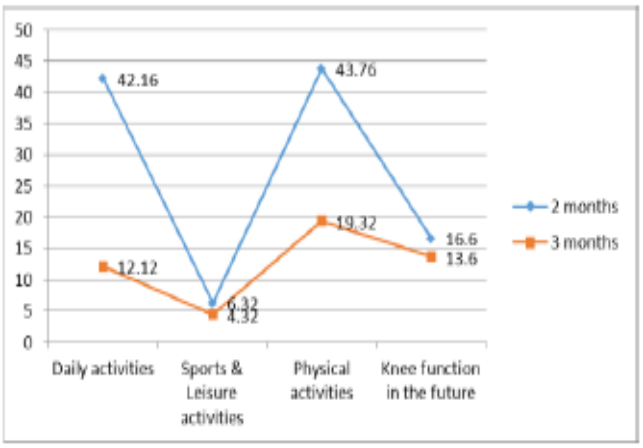
Garph-5.9: According to Tegner Activity Score for Grade-3



Graph-5.10: According to KOOS for Grade 2

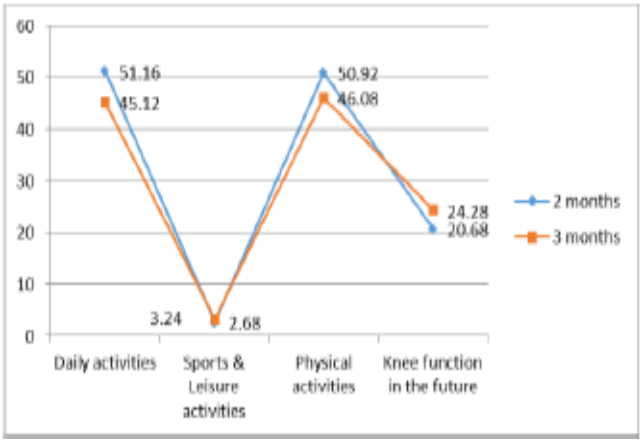


Graph-5.11: According to KOOS for Grade 3



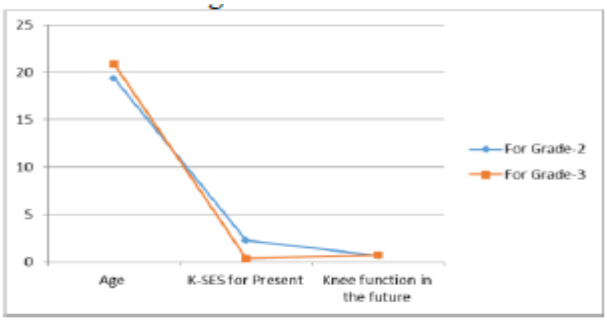
Graph-5.12: Correlation in Present K-SES for Grade-2

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, show no significant difference.



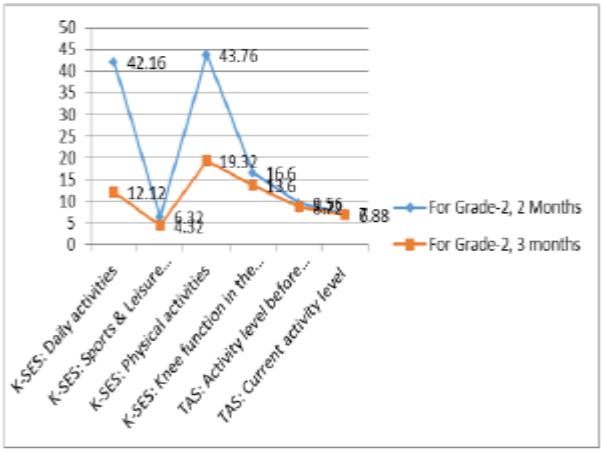
Graph-5.13: Correlation in Present K-SES for Grade-3

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference.



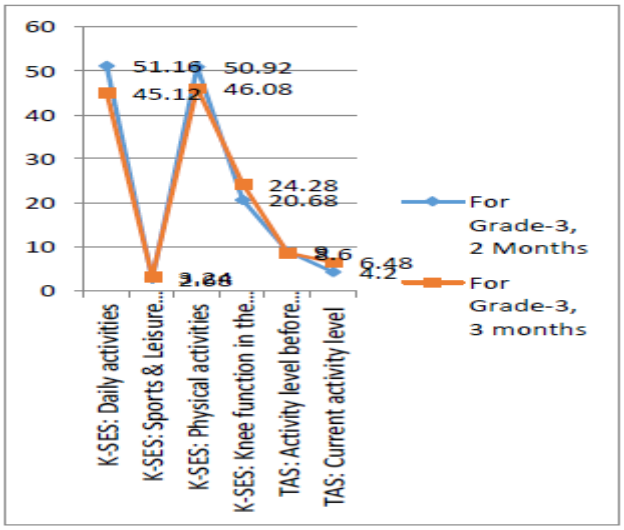
Graph-5.14: Correlation in K-SES for grade-2 & Grade-3

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference in its relation with Age of subjects.



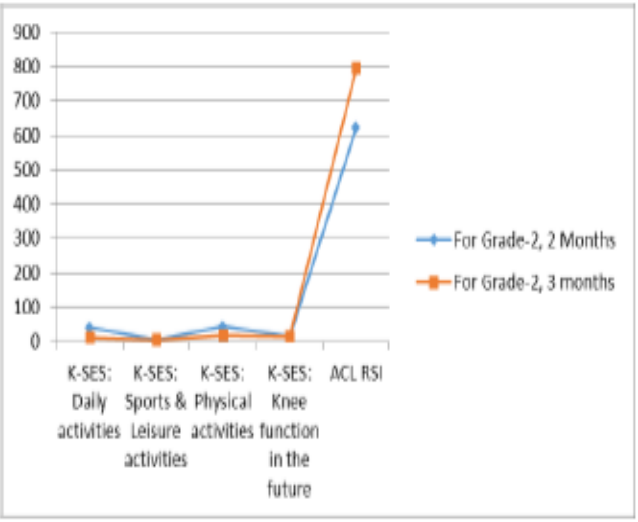
Graph-5.15: Correlation in K-SES for grade-2

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference in its relation with TAS (Tegner Activity Score) of subjects.



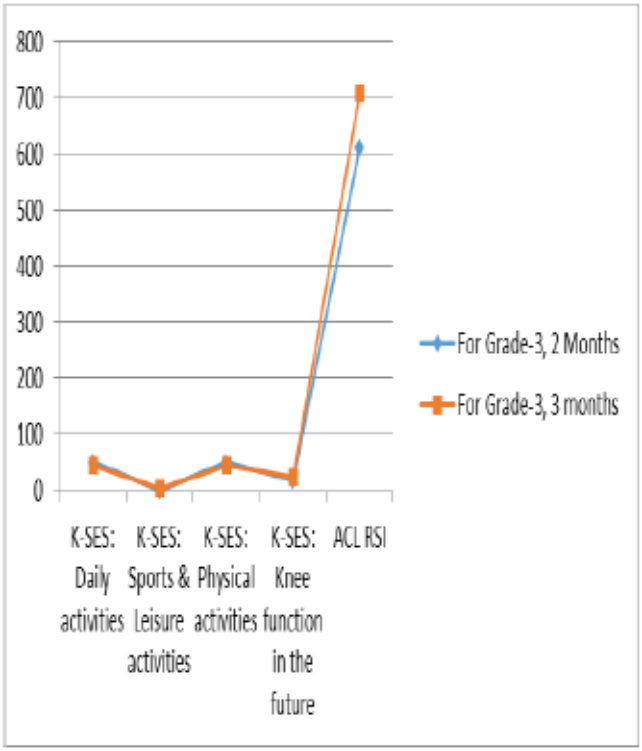
Graph-5.16: Correlation in K-SES for grade-3

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference in its relation with TAS (Tegner Activity Score) of subjects.



Graph-5.17: Correlation in K-SES for grade-2

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference in its relation with ACL RSI of subjects.



Graph-5.18: Correlation in K-SES for grade-3

(Sum of Daily activity, sport-leisure activities & Physical activities) & Future Knee function, shows no significant difference in its relation with ACL RSI of subjects.

INTERPRETATIONS OF RESULT

1. Grade 2 of 2 and 3 month shows not significant p=0.4817
2. Grade 3 of 2 and 3 month shows not significant p=0.4334
3. Grade 2 (2 and 3 month) on grade 3 (2 and 3 month) shows differences because of psychosocial and psychological issues in Indian male athletes.
4. Compare scale on KSES and tegner of grade 2 and grade 3 shows not significant because it can be associated with other factors of self-efficacy like coping strategies or quality of life in Indian population but partly show differences in self-efficacy and physical activity of grade 2 and grade 3.
5. KSES on ACL-RSI of grade 2 and grade 3 shows not significant because of less time limit, ACL injury recovery period is 6 to 12 months.
6. KSES on age of 2ndand 3rdgrade of ACL injury shows not significant because athletes are all inyounger age (16 to 26) but shows some differences comes on age of 2ndand 3rdgrade means that chances are there for significance.

DISCUSSION

Total 50 subjects (25 subjects in each two groups) were taken according to the inclusion & exclusion criteria, those who satisfied the criteria were allowed to perform the study, All total 50 subjects successfully completed the study. All the subjects were taken from Pavilion ground Dehradun, MaharanaPratap sports college Dehradun, sports club Dehradun. on inclusion criteria such as gender male only, young aged (Age 16-45years) with different sports. We excluded the subjects with recent injury at beginning or during study, ACL injury impose serious physical, psychological, psychosocially and economic burderns on athletes. After injury self-efficacy is importance for rehabilitation outcome.

We evaluatedself-efficacy, physical activity participation and return to sport for an ACL injury in Indian male athletes. we found a non-significant role of self-efficacy, physical activity participation and return to sport for an ACL injury in Indian male athletes but differences are found in grade 2 (2 and 3 months) and grade 3 (2 and 3 months) of ACL injury, so we could intend to apply self-efficacy education and its role on rehabilitation in improving physical activity participation and return to sports for better result found and for Indian athletes there is some personal factor, behavior and environmental factors have profound effects on outcomes and there is less time for this study and the injury leads to a long rehabilitation period (6-12 months) and may result in future impairment such as reduced range of motion, reduced strength and difficulty with functional abilities such as jumping, twisting and cutting (Wojtys et al., 1996; Arangio et al., 1997; Carter and edinger, 1999; Pfeifer and Banzer, 1999; Hiemstra et al., 2000; Brandsson et al., 2001; Solomonow and Kroogsgaard, 2001)Physical activity of grade 2 of 3 months decreases as compare to 2 months and as same as in grade 3 of 3 months decreases as compare to 2 months because of the internal risk factors and external risk factors seen different from other countries like internal factors includes body composition (example-body weight, fat mass, BMI), physical fitness (example-maximum 02 uptakes) and skill levels and external factor includes (weather, floor and turt type, maintenance) etc. and all these factors put impact on cognition (includes-interpretations, appraisals and

beliefs). (Pia Thomeé et al., 2007) used physical activity scale to assess physical activity in terms of intensity and frequency, so this is also the one reason of decreases in physical activity level even No intervention was performed in our study further studies are therefore needed to confirm whether early intervention aimed at reinforcing self-efficacy belief would improve the outcome for subjects with an ACL injury & after month. (Pia Thomeé et al., 2008) also concluded that 1 year after ACL reconstruction, about 60% had successfully returned to an acceptable outcome level of pre-injury physical activity because of reduced capacity of muscle function reason for reduced physical activity.

In previous studies (Laxdal et al., 2005) concluded that age and gender did not appear to have any impact on outcome in their large cohort study of patients after an ACL reconstruction. In the present study, age did not have any significant effect on outcomes because all athletes are younger, aged minimum 16 and maximum 26.

We concluded that Return to sport increases in grade 2 and grade 3 while self-efficacy increases with time because pain decreases along with time progression and psychological responses of patients changed over time during the rehabilitation means that negative emotions of patients decreased and their feelings about the return to sports increases. According to (Chmielewski T.L. et al., 2008) concluded that level of pain decreased when time progressed after ACL reconstruction, but remained associated with knee function. There was also a decline of fear of movement/ reinjury levels as time progressed. This was only associated with function of the knee when it was measured around a period of returning to sport.

(P. Thomeé et al., 2007) has documented the low correlations between the KOOS and the K-SES were found at the3 –month test, but at 12-month test, the correlation was moderate to strong. In present study there is no correlation found between the KOOS and K-SES of grade 2(2 and 3 months) and grade 3 (2 and 3 months) because self-efficacy needs time to develop in individuals and due to less time might be not developed and due to other factors associated like coping strategies, health locus of control/ or quality of life.

In previous study (Brekke et al., 2001) showed that, in case of patients with rheumatoid arthritis, perceived self-efficacy was shown to correlate strongly with quality of life. It opposes the present study due to behavioural factors and efforts of athletes it all develop along with recovery time.

CONCLUSION

Hence, we concluded in our study that, it can be said that the null hypothesis is accepted and alternate hypothesis is rejected. Internal and external risk factors as observed in this study for Indian male athletes. The differences show self-efficacy in grade 2 (2 and 3 months) and grade 3 (2 and 3 months) of ACL injury is because of psychosocial, psychological factors and the environmental factors.

CLIN ICAL RELEVANCE

These scales can help to assess the physical level of a athlete before training, so that we can work on the aspects in which they are lacking and help to prevent from future injuries. These scales can also help to improve their performance after ACL injury.

LIMITATION OF THE STUDY

- Time limit of the study was less.

- Baselining physical activity data is not there for comparing the differences.

According to my studies English knee self-efficacy scale is not suitable for Indian athletes because they showed their interest only in their specified game.

FUTURE STUDIES

- For better result we can assume that more time can be considering factor.
- Future studies should pretest the KSES in a standardized way and minimize and maximum of patients age varied across the different follow-ups.

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