Preoperative psychological competitive ability is associated with emotional states 6 months after anterior cruciate ligament reconstruction

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INTRODUCTION:
Anterior cruciate ligament (ACL) injury is a common knee joint trauma in sports, to which the solution is typically surgical treatment. Return to sports after ACL reconstruction (ACLR) is a major issue, and it has been reported that various factors such as knee joint function, muscle strength, competition level, and psychological aspects play significant role in the risk of re-injury. In our hospital, the Diagnostic Inventory of Psychological-Competitive Ability for Athletes (DIPCA.3) is used for psychological evaluation of patients undergoing ACLR. DIPCA.3 is a battery that evaluates the psychological characteristics of athletes based on five factors (12 categories with 48 questions). These factors are divided into 5 levels of psychological competitive ability based on the overall score: "volition for competition", "mental stability and concentration", "confidence", "strategic ability", and "cooperation". Psychological aspects also include emotional states, and Profile of Mood States 2nd Edition (POMS2) is used for emotional states evaluation. POMS2 consists of 5 negative factors; Anger-Hostility (AH), Confusion-Bewilderment (CB), Depress-Dejection (DD), Fatigue-Inertia (FI), Tension-Anxiety (TA) and 2 positive factors; Vigor-Activity (VA) and Friendliness (F). The five negative factors subtracting VA are calculated as Total Mood Disturbance (TMD). The lower score for negative factors and TMD, and higher score for positive factors indicate better emotional states.
 It has been reported that negative psychological states are associated with knee function and return to sports after ACL reconstruction. However, it is unclear whether psychological competitive ability is related to emotional states.
 The objective of this study was to clarify the relationship between psychological competitive ability and emotional states 6 months after ACLR.

METHODS:
Eighty-four patients (male: 36 patients, female: 48 patients) who underwent ACLR between 2015-2021 were included in this prospective study. All patients performed DIPCA.3 and POMS2 preoperatively. POMS2 was also performed at 6 months after ACLR. Patients were classified into two groups using DIPCA.3: those with an overall DIPCA.3 score of 4 or higher (High group) and those with an overall DIPCA.3 score of less than 4 (Low group). Twenty-three patients (male: 11, female: 12, average age: 23.1±8.0) were included for the High group and 61 patients (male: 25, female: 36, average age: 20.3±8.5) were included for the Low group. The preoperative and 6-month postoperative POMS2 items were compared between the two groups divided by DIPCA.3.

RESULTS:
There was no statistically significant difference in the preoperative negative items (Table 1). However, there was a statistically significant difference in VA (p=0.02) and F (p<0.01) for the positive items (Table 1). There was a statistically significant difference in the negative item FI (P<0.01), positive items VA (p<0.01) and F (p<0.01) further TMD (P<0.01) at 6 months after ACL reconstruction (Table 2).

DISCUSSION AND CONCLUSION:
Athletes with higher psychological competitive ability were in a positive emotional state preoperatively, and the difference in emotional state was more pronounced at 6 months after ACL reconstruction. It has also been reported that those with higher VA may performed better in sports activities. Thus, a higher VA at 6 months postoperatively may be associated with return to sports.

Table 1 Preoperative Profile of Mood States of 2nd Edition (POMS2)

	High group (n=23)	Low group (n=61)	p value
AH	43.0±8.3	43.6±7.7	0.64
CB	46.5±12.0	49.3±8.7	0.10
DD	49.6±11.5	51.2±10.0	0.24
FI	43.3±9.3	43.6±8.2	0.67
TA	50.0±11.8	48.4±9.3	0.52
VA	54.2±14.5	47.1±10.4	0.02
TMD	45.5±12.2	47.6±8.6	0.16
F	61.0±9.4	52.4±10.1	<0.01

Table 2 POMS2 at 6 months after ACL reconstruction

	High group (n=23)	Low group (n=61)	p value
AH	42.0±5.4	43.3±6.8	0.51
CB	42.3±7.5	45.9±7.5	0.07
DD	44.0±5.8	46.7±7.5	0.11
FI	38.4±5.4	42.7±7.5	<0.01
TA	42.2±7.3	44.6±8.0	0.29
VA	61.0±8.6	51.1±9.7	<0.01
TMD	38.9±7.0	43.9±6.9	<0.01
F	64.8±8.2	52.8±10.2	<0.01