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TITLE: Analysis of Balance and Functional Hop Tests in Athletes with Lower Extremity Injuries by Dual Task Study

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1. Study Protocol

1.1. Pre-measurement

In this study, 19 athletes aged 16-30 years with a history of unilateral lower extremity injury and 20 athletes who have not had a lower extremity injury before were included. The MMSE (Mini Mental State Examination) score of each athlete was calculated. Before starting the measurements, the "Informed Consent Form" was signed by the participants. Before starting the performance measurements, the Mini Mental State Test was applied to the participants. For the cognitive task, the backward digit test of the Wechsler intelligence scale (WISC) was preferred. For the randomized number sequence to be used during dual task measurements to be of suitable difficulty for the cognitive level of the person, a 2-digit random number sequence was first told once, as one digit per second, and the person was asked to say the same number sequence in reverse. For each correct answer, the number of digits of the said number sequence is increased by one. The number of digits in which the person made a mistake was recorded and one more digit of this number was used during the measurements.

1.2. Balance Measurement

Biodex Balance System SD device was used for balance measurement. The device, which has a circular floor, four regions to represent 5° tilt in each region, and four quadrants to measure instability in anterior-posterior-medial-lateral directions, consists of 12 difficulty levels according to tilt formation resistance. The device, which can be used for both analysis and rehabilitation purposes, has different measurements and exercise modes. In calculating the instability level, mathematical formulas are used that consider the time spent by the person in the relevant regions and quadrants in each repetition. Athlete Single Leg Stability was preferred among the test modes included in the Biodex Balance System SD balance device. After the person's name, age and height information were entered into the database of the device, the screen of the device was adjusted to be at eye level according to the height of the athlete. The tests were applied to both legs in a randomized order twice, both as a single task and a dual task with cognitive task. The person took a position with his/her eyes open, the foot of the untested leg resting on the back of the ankle of the tested leg, his/her arms crossed on his/her chest, and the center of balance in the middle of the platform most comfortably. In this position, the coordination of the point where the heel touches the ground and the angle of the foot are recorded in the system. The content of the test was explained to athletes. The analysis protocol was applied at 5 difficulty levels, consisting of 20 seconds, 1 sample and 3 test repetitions, with a 10 second rest between repetitions. In the dual task measurement, while the athlete is in the resting position on the platform, standing behind the athlete is the randomized number in the previously determined number of digits. The sequence was sung twice, approximately one digit per second, in a speaking voice. As soon as the second repetition was finished, the athlete took the test position, and the measurement was carried out. At the end of the measurement, the athlete was asked to say the said number sequence in reverse and the number sequence he said was recorded. A new number sequence is given after every 20 seconds of measurement. During the tests, the related test was canceled and repeated in cases such as opening the arms because of loss of balance, contacting the ground in the air, changing the coordinate of the foot on the ground. General stability index (OSI), anterior/posterior stability index (APSI), medial/lateral stability index (MLSI) were recorded.

1.3. Functional Hop Test Measurement

All the jump tests were applied to each leg separately. The test was repeated in cases where athlete touched the ground with his/her other foot, could not maintain his/her stability during the descent, and received support with his/her hand. For each jump, 1 sample and 2 measurements were applied on each leg. Hops were measured twice as a single task and a

dual task with cognitive task. During the dual task, while the athlete was in the ready position at the starting line, the random number sequence with the previously determined digits was repeated 2 times, standing behind the athlete, with a speaking voice, approximately one digit per second. After the second repetition, the athlete was asked to start jumping. At the end of the jump, the athlete was asked to say the said number sequence in reverse and the number sequence he/she said was recorded.