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Kinematic properties of judo athletes when performing the throwing technique uchimata.

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INTRODUCTION:

Severe neck injury of attacker in judo (tori) often occurs in the situation where tori tries to throw the opponent (uke), caused by direct hitting of the head against mat (tatami) resulting in hyperflexion of the cervical vertebrae, especially in uchimata. However, there is no sophisticated instruction method to teach uchimata based on the detailed kinematical analysis. In addition, most previous studies exhibiting the kinematical feature of uchimata have focused on the movement of tori when the opponent makes no resistance. Thus, the purpose of the present preliminary study was to compare the kinematic features of tori under two conditions where uke intends to resist being thrown or not.

METHODS:

Two female judo athletes subject A and B whose specialties are uchimata participated in the All Japan University Tournament were recruited as tori (left kumite). They conducted two different practices: yakusoku rensyu (uke is thrown by tori with no resistance) and jiyu rensyu (uke resists being thrown by tori, like a real match). In each judo practice, we collected 3D coordinate values of toris body analysis points from the captured video using FrameDias-6 for one trial to throw. The analysis interval was set from the time when tori took off her left foot to take the first step, until ukes back touched tatami after thrown by uchimata. The three phases of toris movement were categorized as follows: "kuzushi" until toris left foot touches the tatami, "tsukuri" until toris right foot touches the tatami, "kake" until ukes back hits against tatami. Forward trunk inclination angle in the sagittal plane was measured by connecting a perpendicular line from the superior tip of the greater trochanter to the tatami and a line from the superior tip of the greater trochanter to the top of the head. The angle formed by lines connecting the top of the humerus head, the epicondyle of the humerus and the scaphoid was defined as the elbow joint angle.

RESULTS:

In both subject A and B, maximal forward trunk inclination angles were observed in kake phase regardless of whether uke resist to being thrown. In subject A, values of the forward trunk inclination angle were obviously greater with resistance (average \pm SD, 110.7 \pm 7.2 deg; maximum, 119.1 deg) than without resistance (average \pm SD, 78.1 \pm 22.0 deg; maximum, 110.2 deg). Additionally, subject B also showed a greater angle with resistance (average \pm SD, 131.3 \pm 12.7 deg; maximum, 148.6 deg) than without resistance (average \pm SD, 96.6 \pm 21.0 deg; maximum, 120.9 deg).

CONCLUSION:

From these preliminary results observed in two judo experts, the forward trunk inclination angle of tori is apparently large when uke resists being thrown and the maximal angle might be derived in kake phase. In other words, if uke resists being thrown by uchimata, the possibility that tori falls into tatami from the top of the head causing to overflex the cervical spine increases as previous studies have expected.

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