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Stroke imbalance of China elite short-distance freestyle athletes

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INTRODUCTION:
In freestyle, the bilateral imbalance of stroke arm restricts the improvement of swimming skills, which not only destroys the streamline of the body and makes athletes lose their best mechanical advantage, but also brings injuries. Therefore, exploring the causes of bilateral imbalance in freestyle and how to evaluate and correct training are the contents that cannot be ignored in swimming training.
METHODS:
In this study, the problem of bilateral imbalance in short-distance freestyle of five elite women in China was explored by inertial measurement unit. After the standard warm-up procedure of daily training, the 15× 200m freestyle test was carried out, and the athletes speed was required to be kept at 80-90% of the maximum heart rate (monitored by polar), and the contribution rate (ICV) of bilateral movement speed was evaluated by inertial measurement unit (Tritonwear, Canada). Using Excel software to explore the swimming data output by the swimming inertial measurement unit, evaluate and record the left and right ICV, so as to obtain the speed contribution value of the right upper limb and the left upper limb in each cycle. The data is corrected by calculating the average speed, and the speed contribution of each swimmers two upper limbs is estimated. At the same time, the swimming speed and the athletes heart rate (Polar) are captured.
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RESULTS:
The data is corrected by calculating the average speed, and the speed contribution of each swimmers two upper limbs is estimated. At the same time, the swimming speed and the athletes heart rate (Polar) are captured.Evaluating two upper limbs is called index (SI)(Robinson, Herzog, &Nigg, 1987):
SI(%)=(X_d-X_nd)/(1/2(X_d+X_nd))×100
Where Xd and Xnd are the average values of peak forces recorded by dominant upper limbs and non-dominant upper limbs, respectively. As recommended by the author, 10% < SI< 10% means symmetry, while Si < 10% and SI>10% means asymmetry.Where Xd and Xnd are the average values of peak forces recorded by dominant upper limbs and non-dominant upper limbs, respectively. As recommended by the author, 10% < SI < 10% means symmetry, while SI < 10% and SI>10% means asymmetry. Left and right ICV Mean±SD and (SI=Mean±SD): 0.05±0.17m/s SI=2%±9% 0.16±0.14 m/s SI=5%±5% 0.04±0.17 m/s SI=2%±6% 0.02±0.37 m/s SI=3%±4% 0.02±0.37 m/s(SI=6%±21%).

CONCLUSION:
The research and analysis show that: 1. The imbalance of swimmers strength, posture, stroke efficiency, joint mobility and stroke path constitutes the main cause of the bilateral imbalance of freestyle; 2. The female short-distance freestyle athletes did not appear unbalanced expansion in the process of gradual fatigue; 3. There are two female short-distance freestyle athletes in the research object, and their asymmetry is above 10%.; 4. Freestyle breathing does not seem to affect the size of athletes bilateral imbalance; 5. The application of swimming special inertial measurement unit and wearable equipment is an effective means to evaluate the bilateral imbalance of freestyle at present.

Topic: **Biomechanics**

Presentation **E-poster**