Physical Fitness Characteristics of Poomsae and Freestyle Poomsae Athletes

Jihwan Park, Jooyoung Lee, Somang Son, Haryeong Lee, Jaeyeop Lee, Somi Yun, Dae Taek Lee*

Exercise Physiology Lab., Kookmin Univ., Seoul, Republic of Korea

* dtlee@kookmin.ac.kr

ABSTRACT

PURPOSE Taekwondo Poomsae may require different physical fitness characteristics depending on performance type. In particular, Poomsae and Freestyle Poomsae performance types are expected to differ in physical demands according to their performance characteristics. Therefore, this study aimed to compare health-related and skill-related physical fitness variables between Poomsae athletes and Freestyle Poomsae athletes to identify fitness characteristics.

METHODS This study included five male Poomsae athletes (19.8±0.4 years, 174.1±6.3 cm, 65.8±7.4 kg, 21.7±1.4 kg/m²) and five male Freestyle Poomsae athletes (18.8±0.8 years, 173.2±5.3 cm, 70.4±6.3 kg, 23.4±1.3 kg/m²). The measured variables consisted of health-related physical fitness (cardiorespiratory endurance measured by maximal oxygen uptake, muscular strength by grip strength, muscular endurance by sit-up and push-up, and flexibility by sit-and-reach) and skill-related physical fitness (power by vertical jump and agility by side-step). After confirming normality, independent t-tests were performed to compare variables between groups, and statistical significance was set at $p<.05$. This study was approved by the Institutional Review Board of Kookmin University (IRB No. KMU-202601-HR-552).

RESULTS Comparison of health-related physical fitness such as cardiorespiratory endurance, muscular strength, muscular endurance and flexibility between groups showed no differences ($p>.05$). However, maximal heart rate was significantly higher in Freestyle Poomsae athletes than in Poomsae athletes (202.1±4.2 vs. 193.6±4.9 bpm, $p<.05$). Among skill-related fitness, power was significantly higher in Freestyle Poomsae athletes than Poomsae athletes (64.0±5.8 vs. 52.6±7.1 cm, $p<.05$), whereas no difference was found in agility between groups ($p>.05$).

CONCLUSIONS The findings indicate differences in physical fitness between Poomsae and Freestyle Poomsae athletes. In particular, the higher power and maximal heart rate observed in Freestyle Poomsae athletes may reflect differences in physical demands according to Taekwondo Poomsae characteristics.

PURPOSE

- Taekwondo Poomsae includes different performance types that may impose distinct physical demands. This study aimed to compare health-related and skill-related physical fitness variables between Poomsae and Freestyle Poomsae athletes.
- These findings may help identify performance type-specific fitness characteristics in Taekwondo Poomsae athletes.

INTRODUCTION

- **Poomsae:** A prescribed sequence of offensive and defensive Taekwondo techniques performed against an imaginary opponent.
- **Freestyle Poomsae:** A Taekwondo Poomsae competition format performed with music, incorporating, Taekwondo techniques such as jumping side kicks, multiple front kicks, spinning kicks, sparring-style kicks, and acrobatic movements.
- **Scan the QR codes below to view example videos of Poomsae and Freestyle Poomsae performances.**

Poomsae

Freestyle Poomsae

Source: Korea Taekwondo Association

METHODS

- Variables were classified into health-related and skill-related fitness.
- Grip strength, back strength, sit-and-reach, vertical jump, and side-step were measured three times, and the best value was used. Sit-up and push-up were recorded for 1 minute, and side-step for 20 seconds.
- After confirming normality, independent t-tests were used to compare physical fitness variables between the two groups.

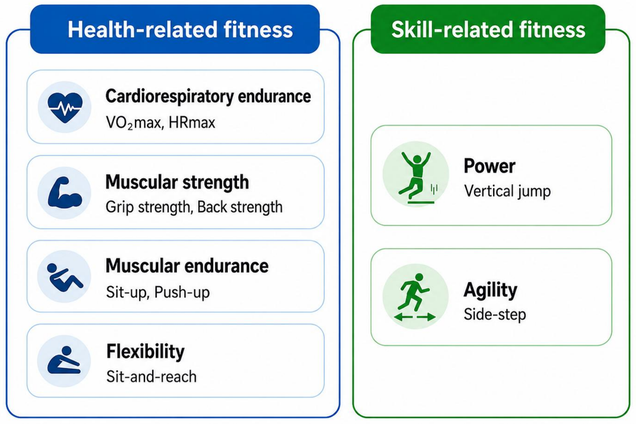


Figure 1. Physical fitness variables

RESULTS

Table 1. Comparison of physical fitness variables between Poomsae and Freestyle Poomsae athletes

Variable	Poomsae	Freestyle Poomsae	*t*	*p*	Hedges' g
VO_2max (mL/kg/min)	54.1±6.2	53.1±5.0	0.286	0.782	0.163
HR_{max} (bpm)	193.6±4.9	202.1±4.2	-2.728	0.029*	-1.625
Left grip strength (kg)	36.7±4.4	42.7±6.0	-1.786	0.112	-1.020
Right grip strength (kg)	40.8±6.4	40.6±6.5	0.039	0.970	0.022
Back strength (kg)	121.2±29.3	112.0±14.9	0.626	0.549	0.357
Sit-up (reps/min)	44.6±8.0	49.5±10.0	-0.821	0.439	-0.489
Push-up (reps/min)	50.6±12.7	51.0±12.5	-0.050	0.961	-0.029
Sit-and-reach (cm)	28.1±3.1	21.5±6.2	2.113	0.068	1.206
Vertical jump (cm)	52.6±7.1	64.0±5.8	-2.928	0.019*	-1.672
Side-step (reps/20sec)	51.8±7.2	53.0±4.3	-0.320	0.757	-0.183

Values are presented as mean ± SD. *$p < 0.05$.

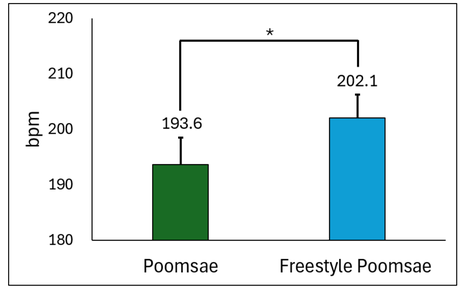


Figure 2. HRmax during the VO_2max test

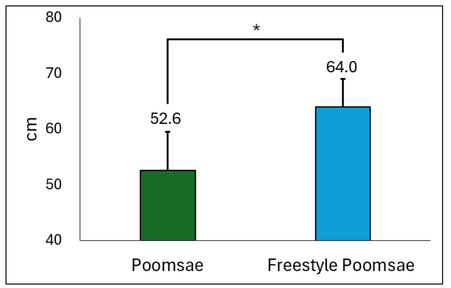


Figure 3. Vertical jump performance

CONCLUSION

- Freestyle Poomsae athletes showed higher vertical jump performance, suggesting greater lower-body explosive power related to jumping, spinning, and high-difficulty kicking movements.
- Although HRmax was higher in Freestyle Poomsae athletes, similar VO_2max between groups suggests that this reflects heart rate response rather than cardiorespiratory endurance.
- These findings suggest that training programs for Taekwondo Poomsae athletes should consider the different fitness characteristics required for Poomsae and Freestyle Poomsae performance.