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Biomotor ability of taekwondo athletes as promotion and degradation

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ABSTRACT

Efforts to revive the glory of sports in Papua continue to be carried out by the Papuan government by fostering talented young athletes. The study aims to describe the results of measuring the biomotor components of taekwondo athletes as a consideration for the promotion and degradation of student sports education and training center athletes in taekwondo sports. The type of research used is descriptive comparative. The population was 80 athletes using purposive sampling specifically taekwondo sports athletes totalling 29 athletes. Data collection techniques sit and reach, vertical jump, sit up, push up, back and leg dynamometer,and bleep test. Data analysis techniques using comparative descriptive statistics. The results showed that the dominant category of biomotor components included flexibility "sufficient" 82.8%, power "excellent" 41.4%, arm muscle endurance category "moderate" 72.4%, abdominal muscle endurance category "moderate" 65.5%, back muscle strength category "moderate" 51.7%, leg muscle strength category "moderate" 44.8%, and VO2Max category "less" 48.3%. Based on the results of the research, male athletes who are recommended for promotion are 12 athletes and female athletes are 11 athletes. Conclusion: It was found that the biomotor component of power was better than the other components and there were significant differences in biomotor power and abdominal muscle endurance between promotion and relegation athletes.

***Keywords**: biomotor, taekwondo, promotion, degradation*

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INTRODUCTION

Taekwondo is a Korean martial art with a long history that began more than 2000 years ago around 50 BC, taekwondo was found on the walls of an ancient royal tomb in Korea called Muyong-Chong, on the walls depicting people practicing Taekwondo moves, parries, and punches (Collierville, 2018). Taekwondo is one of the fastest growing martial arts sports in Indonesia (Muharram & Puspodari, 2020). Taekwondo matches are divided into two numbers, namely Kyourugi numbers and Poomsae numbers (Sukmawati, 2019). Optimal development is carried out through a professionally managed coaching process in an effort to optimise athlete potential to achieve peak performance. In the stage of achieving peak performance, regular, structured, measured and programmed training is needed to get training adaptations including physical, technical, tactical, and mental. Therefore, every athlete has an optimal biomotor component. The dominant components in athlete development and training include anthropometric, biomotor, and psychological aspects (Sukamti, 2018). Another opinion reveals

that professional athletes face a high level of competition, so that each athlete requires optimal biomotor components (Nidomuddin et al., 2023). Basically, every sport requires dominant biomotor abilities according to the characteristics of the sport (Junaidi, 2018).

Biomotor components are influenced by energy fitness and muscle fitness, while energy fitness includes aerobic and anaerobic capacity, while muscle fitness includes strength, endurance, speed, explosive power, flexibility (Burhanuddin et al., 2021) (Sukmawati, 2019). In an effort to achieve peak performance taekwondo athletes must have good biomotor components through a programmed training programme. Through the biomotor component an athlete can be predicted to achieve the championship target. Biomotor characteristics are the most influential factors in determining athlete performance (Susanto et al., 2021). Good biomotor components are very important to achieve an efficient movement that will affect good movement skills. Among the several biomotor components that play a role in taekwondo include strength, muscle endurance, power, flexibility, aerobic endurance, speed, agility, and reaction speed (Purba et al., 2018). The factors that affect biomotor will also affect the athlete's physical condition either during the training process or in facing competition. If the athlete's biomotor component is in good condition, the athlete will be faster at performing various movements in sports and mastering the movement techniques that are trained so that it will affect the athlete's performance (Burhanuddin et al., 2021). Based on this, it is necessary to conduct routine parameter tests for athletes to determine the biomotor abilities of PPLP /PLPD Papua Province athletes. In this study, tests and measurements of the biomotor abilities of taekwondo athletes will be carried out.

Promotion is the process of recruiting outstanding athletes who are usually carried out based on certain regions or provinces to enter the athlete concentration organisation, namely the sports education and training centre, for example PPLP / PLPD, while the degradation system is a process of selecting athletes in the sports training centre to be removed or drop out before their coaching period as athletes is complete (Retno, 2014). The existence of an athlete promotion and degradation system in the achievement coaching process can spur athletes to continue to practice optimally in order to achieve optimal performance (Alim, 2020). West Java Province applies a promotion and degradation system in PPLP for athletes who drop out every year (Retno, 2014). Similarly, the Indonesian Menpora stated that the promotion and degradation system for sports in the Presidential Regulation (Perpres) concerning the Grand Design of National Sports (DBON) Number 86 of 2021 must be carried out and carried out properly (Perpres, 2021). However, the results of the study revealed that the promotion and

degradation system at PPLP Taekwondo in DKI Jakarta Province was not in accordance with the established criteria (Putri & Muslim, 2017). Based on this, it is necessary to implement a system of promotion and degradation of athletes in PPLP / PPLP Papua Province professionally and in accordance with the established criteria.

The biomotor component is needed for an athlete to achieve the highest achievement, thus the facts above are a good basis for athletes to improve training. In addition, it is important for a coach to know the biomotor of each training child as data and consideration for the next event (Susanto et al., 2021). Based on theoretical studies and the results of previous research, it is necessary to test the biomotor component parameters of PPLP /PLPD athletes in Papua Province as a consideration for athlete promotion and degradation. In this study, the biomotor components of athletes specialising in taekwondo will be studied.

METHODS

This study uses a type of quantitative research with a comparative descriptive method. This study not only aims to determine the biomotoric components of taekwondo athletes as a consideration for the promotion and degradation of athletes, but also to determine the differences in the biomotor components of male athletes and female athletes of PPLP / PLPD Papua Province. The population in the study amounted to 80 athletes consisting of 11 sports. The sampling technique used purposive sampling with special criteria for taekwondo athletes totalling 29 athletes. The sample consisted of 16 male athletes and 13 female athletes with an average age of 17 years and 8 months. Data collection techniques used seven instruments including sit and reach to measure flexibility the validity value of the sit and reach test instrument is 0.990 (valid) and reliability value of 0.995 (high reliability), vertical jump to measure power the validity value of the vertical jump instrument of 0.805 has high validity and reliability of 0.683 (high reliability), sit up to measure abdominal muscle endurance the validity value of the sit-up test instrument is 0.740 (valid) and reliability value of 0.698 (high reliability), push up to measure arm muscle endurance the validity value of the push up test instrument is 0.965 and reliability value of 0.982 (high reliability), back and leg dynamometer to measure back muscle strength and leg muscles the validity value of the back and leg dynamometer test instrument is 0.745 and reliability value of 0.960 (high reliability), and bleep test to measure VO2Max the validity value of the bleep test instrument is 0.915 and reliability value of 0.868 (high reliability). Data analysis technique using comparative descriptive

statistical analysis with independent sample t test.

RESULTS AND DISCUSSION

This study aims to obtain data that describes the biomotor components of taekwondo athletes at PPLP / PPPD Papua Province as a consideration for athlete promotion and degradation. In addition, this study also aims to determine the differences in the biomotor abilities of male athletes and female athletes in taekwondo at PPLP/PPLPD Papua Province.

Results

Based on the results of research obtained through measurement using seven test instruments to determine the biomotor abilities of taekwondo athletes at PPLP / PPPD Papua Province which are obtained using SPSS version 29, they are described as follows:

Table 1. Results of Analysis of Respondents' Characteristics

Gender	F	%	Average Age	Average Body Height (cm)	Average Body Weight (kg)
Male	16	55.17	17year 8 month	162	54.23
Female	13	44.83			

Table 2. Measurement Results of Biomotor Components of Male Taekwondo Athletes

No	Athlete	Biomotor	Category	Age (year)	Recommendation
1	VI	Flexibility	Moderate	16	Promotions
		Power	Very Good		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Good		
		Back muscle strength	Good		
		Leg muscle strength	Moderate		
		VO2Max	Fair		
2	FS	Flexibility	Moderate	15	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Good		
		VO2Max	Fair		
3	LLW	Flexibility	Less	16	Degradation
		Power	Moderate		
		Abdominal muscular endurance	Less		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Fair		

4	MFAB	Flexibility	Moderate	17	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Fair		
5	SFG	Flexibility	Moderate	21	Degradation
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Very less		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Less		
6	DIS	Flexibility	Moderate	18	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Fair		
		Leg muscle strength	Good		
		VO2Max	Less		
7	SF	Flexibility	Good	17	Promotions
		Power	Good		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Good		
		VO2Max	Fair		
8	OK	Flexibility	Moderate	16	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Less		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Good		
9	CW	Flexibility	Moderate	16	Promotions
		Power	Good		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Fair		
10	FA	Flexibility	Moderate	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		

		Back muscle strength	Good		
		Leg muscle strength	Good		
		VO2Max	Fair		
11	RJRP	Flexibility	Moderate	17	Degradation
		Power	Less		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Fair		
12	JEP	Flexibility	Moderate	20	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Excellent		
		Leg muscle strength	Moderate		
		VO2Max	Fair		
13	RE	Flexibility	Moderate	17	Promotions
		Power	Good		
		Abdominal muscular endurance	Good		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Good		
14	JG	Flexibility	Less	25	Promotions
		Power	Good		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Good		
		Leg muscle strength	Good		
		VO2Max	Less		
15	MGM	Flexibility	Less	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Good		
		Arm muscular endurance	Moderate		
		Back muscle strength	Good		
		Leg muscle strength	Good		
		VO2Max	Less		
16	DO	Flexibility	Moderate	18	Degradation
		Power	Moderate		
		Abdominal muscular endurance	Less		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Fair		

Based on the results of measuring biomotor components, it was found that out of 16 male

taekwondo athletes, 12 athletes were recommended to be promoted and 4 athletes were recommended to be relegated.

Table 3. Measurement Results of Biomotor Components of Female Taekwondo Athletes

No	Athlete	Biomotor	Category	Age (year)	Recommendation
1	NSP	Flexibility	Moderate	18	Promotions
		Power	Good		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Fair		
		Leg muscle strength	Fair		
		VO2Max	Less		
2	WS	Flexibility	Moderate	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Less		
3	CC	Flexibility	Moderate	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Fair		
		Leg muscle strength	Good		
		VO2Max	Less		
4	GAWS	Flexibility	Moderate	18	Degradation
		Power	Moderate		
		Abdominal muscular endurance	Less		
		Arm muscular endurance	Moderate		
		Back muscle strength	Fair		
		Leg muscle strength	Fair		
		VO2Max	Less		
5	MDR	Flexibility	Moderate	16	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Good		
		Leg muscle strength	Moderate		
		VO2Max	Fair		
6	MPP	Flexibility	Moderate	15	Degradation
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		

		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Less		
7	HAM	Flexibility	Moderate	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Good		
		Arm muscular endurance	Moderate		
		Back muscle strength	Good		
		Leg muscle strength	Moderate		
		VO2Max	Less		
8	ZAKS	Flexibility	Good	16	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Less		
		Arm muscular endurance	Moderate		
		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Less		
9	SRD	Flexibility	Moderate	21	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Moderate		
		VO2Max	Less		
10	JS	Flexibility	Moderate	23	Promotions
		Power	Moderate		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Good		
		Leg muscle strength	Moderate		
		VO2Max	Less		
11	JK	Flexibility	Moderate	16	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Less		
		Back muscle strength	Moderate		
		Leg muscle strength	Fair		
		VO2Max	Less		
12	TKD	Flexibility	Moderate	18	Promotions
		Power	Excellent		
		Abdominal muscular endurance	Moderate		
		Arm muscular endurance	Moderate		
		Back muscle strength	Good		
		Leg muscle strength	Fair		
		VO2Max	Less		
13	CBDR	Flexibility	Moderate	16	Promotions

Power	Excellent
Abdominal muscular endurance	Moderate
Arm muscular endurance	Moderate
Back muscle strength	Good
Leg muscle strength	Fair
VO2Max	Less

Based on the results of the measurement of biomotor components, it was found that out of 13 female taekwondo athletes, 11 athletes were recommended to be promoted and 2 athletes were recommended to be relegated.

Table 4. Dominant Biomotor Components of Taekwondo Athletes

Biomotor Components	Dominant	F	%
Flexibility	Fair	24	82.8
Power	Excellent	12	41.4
Abdominal muscular endurance	Moderate	19	65.5
Arm muscular endurance	Moderate	21	72.4
Back muscle strength	Moderate	15	51.7
Leg muscle strength	Moderate	13	44.8
VO2Max	Less	14	48.3

Based on the results of data analysis, it is found that the biomotor components possessed by taekwondo athletes PPLP / PPLPD Papua Province generally need to be improved, especially the ability of aerobic endurance (VO2Max) which is dominant in the less category.

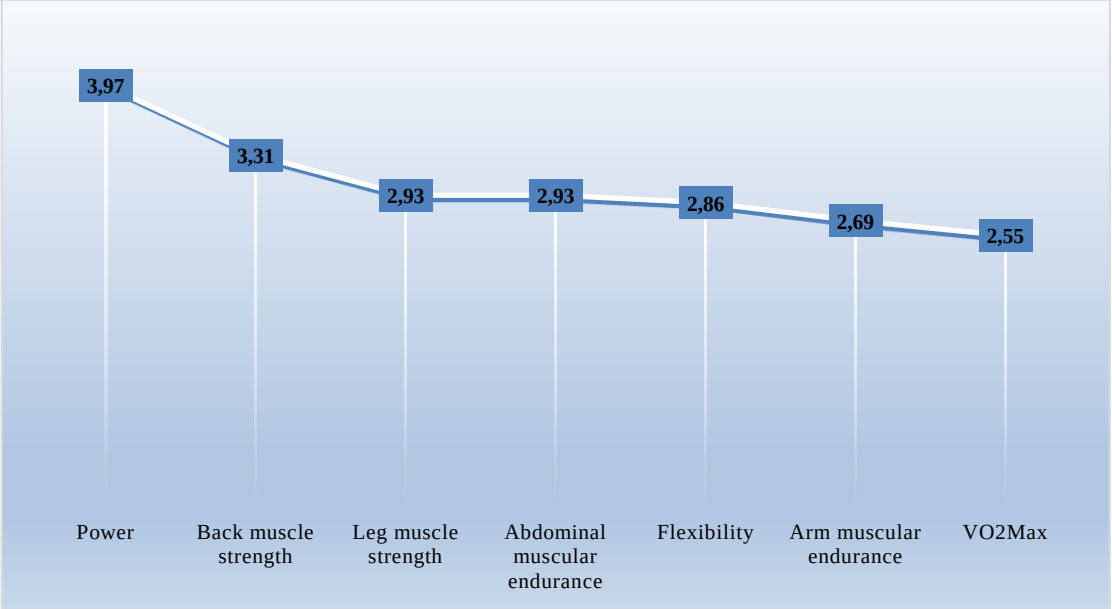

Figure 1. Dominant Biomotor Skills of Taekwondo Athletes

Table 5. Results Independent Samples Test Promotion and Degradation of Athletes

Biomotor Components	*Levene's Test (sig.)*	Summary	*Sig (2-tailed)*	Summary
Flexibility	0.069	Homogen	0.185	No difference
Power	0.114	Homogen	0.001	There is a difference
Abdominal muscular endurance	0.166	Homogen	0.025	There is a difference
Arm muscular endurance	0.106	Homogen	0.121	No difference
Back muscle strength	0.128	Homogen	0.061	No difference
Leg muscle strength	0.593	Homogen	0.197	No difference
VO2Max	0.593	Homogen	0.554	No difference

Based on the results of the independent samples t-test analysis, it was found that between athletes recommended for promotion and degradation there were significant differences in the biomotor components of power and abdominal muscle endurance, while in the biomotor components of flexibility, arm muscular endurance, back muscle strength, leg muscle strength, and vo2max there were no significant differences.

Discussion

Based on the results of this study, it was found that the biomotor components of taekwondo athletes PPLP / PPLPD Papua Province need to be improved more optimally, especially athletes with dominant biomotor components in the deficient category and have the potential to be degraded. As stated that to reach the level of elite athletes is supported by optimal biomotor abilities such as speed, strength, endurance, flexibility to agility (Humaedi et al., 2023). Biomotor components are human movement abilities that are influenced by the condition of the organ systems in the body (Susanto et al., 2021) (Kardi & Ita, 2023). Taekwondo is a martial sport that requires good biomotor components because in taekwondo matches there is a fight or body contact that requires optimal biomotor components including strength, speed, and balance (Wibandoro & Jatmiko, 2017). It is further explained that biomotor abilities will affect the athlete's physical condition to be able to compete in competition, if the athlete's biomotor components are in good condition, the athlete will perform movements more quickly, effectively, and efficiently, so that it will affect the athlete's performance in the match (Humaedi et al., 2023). It is confirmed that improving the biomotor component is one of the right supporting factors (Rivaldi et al., 2023) (Syaiful et al., 2023).

The results of this study also reveal that the dominant biomotor component possessed by taekwondo athletes PPLP / PPPD Papua Province is leg muscle power. This is because

taekwondo is a martial art that uses limbs more dominantly than hands (Rahmalia & Fahrizqi, 2022). Taekwondo techniques that predominantly use limbs make athletes adapt and have strength, speed, and leg muscle power more dominant than other limbs. As stated that to be able to get points athletes must master the correct kicking ability, namely by doing the right attack technique (Putri et al., 2022). Basically taekwondo kicking techniques have three goals including: 1) The top/head or face target kick is called Eolgol; 2) The target kick of the abdomen or solar plexus located in the middle of the body is called Momtong; and 3) The lower target kick covers from the navel down which is called Aare (Erwina et al., 2022). The dominance of leg muscle power possessed by athletes, because taekwondo basically emphasises kicking techniques carried out in a moving attitude, using greater reach, strength, speed, and leg power to knock out opponents (Zulman et al., 2021).

Based on the results of the study it was found that there were no significant differences between the biomotor components of male and female athletes in flexibility, power, abdominal and arm muscle endurance, back muscle strength, and VO2Max. the difference is only in leg muscle strength. Basically, leg muscle strength is one of the biomotor components that form leg muscle power, so through this study it was found that leg muscle strength and power are components that taekwondo athletes must have. The results of this study are strengthened by the results of previous research which revealed that there was a difference in the contribution of leg muscle power for male athletes by 75.2% and female athletes contributed power by 64.5% (Erwina et al., 2022). Similarly, it is revealed that good physical fitness and biomotor components can determine success in the form of athlete achievements in every sport (Nidomuddin et al., 2023). Therefore, special attention needs to be paid to the biomotor component, especially the strength and power of the limb muscles of taekwondo athletes. Various studies have shown that high levels of muscle strength are significantly associated with sports performance (Junaidi, 2018). Similar research results state that to excel in sports athletes must focus on developing important techniques and strength in the leg muscles (Hidayat et al., 2023).

CONCLUSION

Based on the research results obtained, it is concluded that there are six athletes who are recommended to be relegated in terms of biomotor ability components that are still lacking, so they need to train more optimally, especially to improve biomotor abilities. This study also

revealed that leg muscle power is the dominant biomotor ability possessed by PPLP / PLPD Papua Province athletes. In addition, there were significant differences between leg muscle power and abdominal muscle endurance of promoted and relegated athletes, although in the biomotor components of flexibility, arm muscular endurance, back muscle strength, leg muscle strength, and vo2max there were no significant differences.

Based on the results of this study, it is recommended to coaches, coaches, and athletes of PPLP/PPLPD Papua Province athletes to optimise athlete coaching programs, especially in terms of improving athletes' biomotor abilities. It is recommended that future research focus on developing the components of athletes' biomotor abilities, so that athletes who have good biomotor components can be promoted and still have the opportunity to be maintained at PPLP/PPLPD Papua Province by making achievements both nationally and internationally.

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