

The Impact of Functional Training on Physical Abilities in Combat Sport: A Mini Review

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Abstract

This research aims to explore more deeply the impact of functional training on improving the physical abilities of combat sport athletes. By analyzing and evaluating various related studies, the results of this research will provide in-depth insight into the effectiveness and relevance of functional training in the context of athlete development in combat sports. This type of research is a literature review, by searching for articles via Google Scholar. The search results found 5 articles from 2022 - 2023 that were in accordance with the topic of this research (Table 1). The types of combat sports that have been identified are judo, martial arts, wrestling, sambo, taekwondo. The conclusion of this research is that functional training is a training method that focuses on improving the performance of combat sport athletes because it involves certain muscles or movements according to the type of combat sport. The type of training applied in this training can be adjusted to the athlete's condition or periodization phase, of course with clear objectives. So the advantage of functional training is that it can adapt from other training methods such as body weight, machine assistance or other equipment. However, from further analysis of the sample and research results, it appears that athletes who undergo functional training are athletes who are trained or have had a lot of competition experience. The opinion of the results of this research is that functional training is specifically for athletes who are experienced or have had a lot of training hours.

Keywords: Functional Training, Combat Sport, Athlete Performance.

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INTRODUCTION

In this contemporary era, improving athlete performance has become a focus that cannot be ignored. In the world of sports, especially in branches that demand optimal physical abilities such as combat sports, developing effective training methods is the key to achieving an athlete's maximum potential (Devi *et al.*, 2022), (Fadhila *et al.*, 2024). One method that is receiving increasing attention is functional training. Functional training is an exercise approach that emphasizes improving physical abilities by imitating movements in daily activities or in the specific context of a sport (Kudryavtsev *et al.*, 2023), (Wu *et al.*, 2023). For athletes in combat sports, such as boxing, mixed martial arts and wrestling, physical excellence is the main key to achieving success on the arena of competition (Beránek *et al.*, 2023). Therefore, the

influence of functional training on the physical abilities of athletes in this sport needs serious attention.

Combat sport athletes require high functional abilities in their fights. Functional training is designed to improve physical abilities that can be directly applied in combat situations, such as strength, speed, endurance, balance and flexibility (Krkeljás & Kovac, 2021). By focusing on movements that are similar to real combat situations, athletes can significantly improve their performance. The movements in functional training often imitate movements encountered in actual combat (Tachi *et al.*, 2023). For example, practicing punches, kicks, defensive movements and agility movements. This allows athletes to effectively strengthen and improve their technique, while improving overall physical condition.

This research aims to explore more deeply the impact of functional training on improving the physical

abilities of combat sport athletes. By analyzing and evaluating various related studies, the results of this research will provide in-depth insight into the effectiveness and relevance of functional training in the context of athlete development in combat sports. Through a literature review approach, this research will bridge the current understanding of the relationship between functional training and athletes' physical abilities (Xiao *et al.*, 2021), as well as providing a strong foundation for the development of more effective training strategies in the future.

Thus, it is hoped that this research can make a significant contribution in enriching the scientific literature on sports training, especially in the context of developing the physical abilities of combat sport athletes. In addition, it is hoped that the results of this research can be a reference for coaches, researchers and sports practitioners in designing optimal training programs to improve athlete performance in competitive matches.

METHOD

This type of research is a literature review, this type of research focuses on analyzing and evaluating

previously published research results. So the results of the literature review research aim to understand and explain the state of the research in accordance with the objectives of this research. However, this research method uses a mini review, meaning there are certain limitations such as the number of articles, article searches, and indexes of journals that publish articles.

Search for this article through the database on Google Scholar with the keywords 'functional training', 'combat sport' or types of combat sport such as 'MMA', 'Judo', 'Sambo', 'Boxing', 'Taekwondo' etc. Based on this search, 5 articles were found that matched the keywords and were worthy of review. Even though this research uses a mini review, the analysis and evaluation methods remain the same as the literature review method.

RESULTS

The following are the results of analysis and evaluation based on searches on Google Scholar on the research topic of the influence of functional training on athletes' abilities in combat sports. This review analysis consists of 5 articles published from 2022 – 2023.

Table 1: Research Analysis Results

No	Name (Year)	Title	Sample	Type of Exercise	Training Load	Result
1	Purnamasari, I., Febrianty, M. F., Mulyana, D., Hidayah, N., Novian, G., & Putri, S. C. (2022)	Functional Training: Effect on Arm Muscle Endurance, Leg Muscle Endurance, Aerobic Capacity and Body Mass Index at the Judoka in the Train-to-Train Stage	16 athletes Female (11 - 15 years old) and male (12 - 15 years old). The minimum athlete level is kyu 5	Step Up, Plank, T Push Up, X-Ups, Squat Jump	16 meetings held 3 times a week	There was no increase in arm muscle strength and aerobic endurance. There is an increase in leg muscle endurance, body mass index
2	Jia, P., & Zhang, M. (2022)	Effects of Functional Training on Proprioception in Sport Athletes	50 atlet. (judo, martial arts, wrestling, tennis team, swimming team, and table tennis team)	Daily training methods according to the type of sport	6 months training	Functional training can improve athletes' physical flexibility and motor coordination. In addition, the results of Functional training can stimulate the body's proprioceptors, increase the athlete's self-confidence, and make training more efficient and effective
3	Tachii, D., Samoliuc, O., & Cheban, T. (2023).	Functional Training of Sambo Wrestlers During the Preparation Period at The Stage of Sports Specialization	24 athletes aged 13 - 14 years	Regular training program, which includes strength training. In addition, exercises are also offered to improve joint mobility of the thoracic spine, hips, shoulders, wrists and ankles.	10 weeks with 3 times a week	Functional training during the preparation period can increase joint mobility, strength of priority muscle groups, movement coordination and dexterity.
4	Kudryavtsev, M., Osipov, A., Guralev,	Effect of short-term functional training intervention on	22 atlet di kelompok eksperimen/EG	Each training session includes: adequate warm-up (20	Training methods based on CrossFit	There was no significant difference between EG and CG

No	Name (Year)	Title	Sample	Type of Exercise	Training Load	Result
	V., Ratmanskaya, T., Aldiabat, H., Aldiabat, I., ... Karpenko, E. (2023).	athletic performance in elite male combat sambo athletes	(mean age – 20.85±3.16-years-old; mean height – 177.29±7.51 cm; mean body mass – 75.09±12.93 kg). 22 atlet di kelompok kontrol/CG (mean age – 21.26±3.44-years-old; mean height – 179.42±7.15 cm; mean body mass – 77.50±16.11 kg)	minutes); main workout (80-90 minutes); cool down exercise (10-20 minutes). The athletes performed stand-upfight (striking) training (SUF), groundfight (grappling) and throwing (GTT) training, strength training (ST) and sparring sessions (SS) in the pre-competition period.	workout references. Training duration is 12 weeks with evaluation every 4 weeks. Every week athletes train for 17-18 hours per week (90-120 minutes per session). EG and CG hold 2 training sessions a day (morning training and evening training) from Monday to Friday. Then one training session on Wednesday and Saturday.	in the average value (rank position) RP and (technical effectiveness) TE during the first 2 weeks of the competition cycle. There was a significant difference ($p \leq 0.05$) in the average values of RP and TE between EG (experimental group) and CG (control group) during the last 2 weeks of the competition cycle. EG showed higher mean RP and TE values ($p \leq 0.05$) compared with CG.
5	Khazaei, L., Parnow, A., & Amani-shalamzari, S. (2023)	Comparing the effects of traditional resistance training and functional training on the bio-motor capacities of female elite taekwondo athletes	17 athletes (mean age ± standard deviation: 21.7 ± 3.0 years; mean height ± standard deviation: 167.2 ± 6.1 cm). Functional training (FT, n = 9) and traditional resistance training (TRT, n = 8)	Program FT yaitu barbell squats+standing calf raise, alternate push up on a medicine ball, snatch, clean and jerk, lunge+holding medicine ball, and kettlebell single-leg deadlift. Program TRT yaitu Smith squat, barbell chest press, leg extension, lat pull-down, lying leg curl, machine shoulder press, and cable lateral raise.	Training is carried out for 8 weeks, 3 sessions per week, for 75-90 minutes. The load on the FT depends on the exercise between 10 to 40 seconds. TRT load 50-80% of 1RM, 3 - 5 sets, 14 - 6 repetitions, rest between 60 - 120 seconds.	There were no significant differences in aerobic power, anaerobic power, speed, reaction time, agility, muscle strength, dynamic balance, flexibility, upper and lower body muscle strength, core and upper body muscle endurance, and blood lactate levels between the FT and TRT. The FT group showed significant increases in peak power ($P = 0.006$) and mean ($P = 0.015$) from pre to post test.

Based on Table 1, the research results of Purnamasari *et al.*, (2022), the aim of the research is to analyze the effect of functional training on arm muscle endurance, leg muscle endurance, aerobic capacity and body mass index in judo athletes. Types of training are Step Up, Plank, T Push Up, X-up, Squat Jump with 16 meetings held 3 times a week. The results of this study were that there was no increase in arm muscle strength and aerobic endurance. There is an increase in leg muscle endurance, body mass index.

The research results of Jia & Zhang (2022) aim to explore the functional effects on physical sensibility in judo, martial arts, wrestling, tennis, swimming and table tennis athletes. This training method is carried out

according to daily training and is carried out for 6 months. These results explain that functional training can improve athletes' physical flexibility and motor coordination. In addition, the results of Functional training can stimulate the body's proprioceptors, increase the athlete's self-confidence, and make training more efficient and effective.

The research results of Tachii *et al.*, (2023) aim to study the influence of functional training in the preparation period on the physical and technical training indicators of sambo athletes at the sports specialization stage. Types of training include strength training. In addition, Exercises are also offered to improve joint mobility of the thoracic spine, hips, shoulders, wrists and

ankles. Then this training load is carried out for 10 weeks 3 times a week. The results of this research are that functional training during the preparation period can increase joint mobility, strength of priority muscle groups, movement coordination and dexterity.

The research results of Kudryavtsev *et al.*, (2023) aim to study the effects of functional training based on CrossFit training every 4 weeks. The type of training corresponds to the daily exercise method. Analysis of functional training results was carried out in 3 tournaments, so the total training was 12 weeks. The results of this research were that there was no significant difference between the experimental group and the control group in the average value (rank position) RP and (technical effectiveness) TE during the first 2 weeks of the competition cycle. Then there was a significant difference ($p \leq 0.05$) in the average values of RP and TE between the experimental group and the control group during the last 2 weeks of the competition cycle. The experimental group showed higher mean RP and TE values ($p \leq 0.05$) compared with the control group.

The research results of Khazaei *et al.*, (2023) aimed to compare eight weeks of Functional Training (FT) and Traditional Resistance Training (TRT) on the biomotor capacity of elite female taekwondo athletes. The FT program is barbell squats+standing calf raises, alternate push ups on a medicine ball, snatch, clean and jerk, lunge+holding medicine ball, and kettlebell single-leg deadlift. The TRT program is Smith squat, barbell chest press, leg extension, lat pull-down, lying leg curl, machine shoulder press, and cable lateral raise. Training is carried out for 8 weeks, 3 sessions per week, for 75-90 minutes. The load on the FT depends on the exercise between 10 to 40 seconds. TRT load 50-80% of 1RM, 3 - 5 sets, 14 - 6 repetitions, rest between 60 - 120 seconds. There were no significant differences in aerobic power, anaerobic power, speed, reaction time, agility, muscle strength, dynamic balance, flexibility, upper and lower body muscle strength, core and upper body muscle endurance, and blood lactate levels between the FT and TRT. The FT group showed significant increases in peak power ($P = 0.006$) and mean ($P = 0.015$) from pre to post test.

DISCUSSION

The functional training method emphasizes movements that are similar or relevant to daily activities or the specific demands of a sport. This means the exercises are designed to strengthen the muscles used in daily activities or in a particular sport, with the aim of improving performance and preventing injury (Serafim *et al.*, 2022), (Wu *et al.*, 2023)). Fighting in combat sports often results in enormous stress on the body, and the risk of injury is very high. Functional training helps prepare an athlete's body as a whole, including strengthening core muscles, increasing joint stability, and improving body coordination (Bashir *et al.*, 2022).

Therefore, it can help reduce the risk of injury and extend the athlete's career.

In functional training, the movements often involve more than one joint or muscle group simultaneously. This differs from conventional approaches which may focus more on isolating specific muscles (Ide *et al.*, 2022). The integration of movement in functional training reflects real conditions where the human body often moves in complex movement patterns. Functional training can be tailored to individual needs and the specific demands of the sport. In combat sports which have a variety of fighting techniques and styles, it is important for athletes to have flexibility and adaptability in their training (Khazaei *et al.*, 2023), (Hikmah *et al.*, 2023), (Wangi *et al.*, 2023). Functional training allows for more flexible and personalized training, which can be tailored to the needs of each athlete.

Although functional training can be done without using special equipment, it often involves the use of various tools such as small balls, TRX (Total Resistance Exercise), kettlebells, and other tools (Levine *et al.*, 2022), (Sawant & Chavan, 2022), (Rezaei *et al.*, 2024). The use of these tools can add variety to training and produce more complex stimulation for the body. Functional training often emphasizes developing body stability and balance. This is because the movements carried out often involve the use of core muscles to maintain balance, as well as involving exercises to improve body coordination (Cabrejas *et al.*, 2022), (Zheng, 2022).

One aspect that differentiates functional training is its ability to be adapted to the specific needs and demands of a sport or activity (Xiao *et al.*, 2021), (Wang *et al.*, 2023), (Wang *et al.*, 2024). For example, for combat sports athletes, functional exercises can be designed to increase kick strength, punch speed, or endurance in combat. Apart from improving an athlete's performance in the arena, functional training can also provide broad benefits outside the fighting arena. The increased strength, endurance, and balance gained from these exercises can help athletes in their training routines, injury recovery, and overall quality of life (Almas *et al.*, 2023), (Permatasari *et al.*, 2024).

Thus, the main difference between functional training and other training methods lies in a more holistic and contextual approach, with a focus on functional movements that are relevant to daily activities or specific to a sport.

CONCLUSION

Functional training is a training method that focuses on improving the performance of combat sport athletes. Based on the analysis results from the five previous articles, functional training involves certain muscles or movements according to the type of combat

sport. The type of training applied in this training can be adjusted to the athlete's condition or periodization phase, of course with clear objectives. So the advantage of functional training is that it can adapt from other training methods such as body weight, machine assistance or other equipment. However, from further analysis of the sample and research results, it appears that athletes who undergo functional training are athletes who are trained or have had a lot of competition experience. The opinion of the results of this research is that functional training is specifically for athletes who are trained or have had a lot of training hours.

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