

**Kettlebell Exercise Using the Set System Method to Increase Strength Endurance of Shoulder Muscle in Female Wrestling Athletes**Ari Dwi Riyatna^{1✉}, Berliana², Dikdik Zafar Sidik³, Geraldi Novian⁴Study Program of Sport Education, School of Postgraduate Studies, Universitas Pendidikan Indonesia, Indonesia¹²⁴Study Program of Sport Physical Coaching, Faculty of Sport and Health Education, Universitas Pendidikan Indonesia, Indonesia³**Article History**

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Abstract

In the sport of wrestling, a wrestling athlete needs strength endurance in all parts of the body, especially the shoulder muscles which will serve as a starting point for lifting and slamming opponents. But unfortunately, women's wrestling athletes still can't do that, so mistakes often occur. To support this, training with the right guidelines is needed so that the ability to increase physical condition can be achieved efficiently. One model of exercise that is currently popular is the kettlebell training model which has been proven to have various benefits. So this study aims to examine the effect of the kettlebell training model with the set system method on increasing the endurance of the shoulder muscle strength of female wrestling athletes. The experimental method with a randomized pretest-posttest control group design was used in this study. The samples of this study were eight KBB female wrestling athletes who were selected using total sampling from the population, which were then divided into two groups (experimental and control). The instrument used is The Shoulder Endurance Test (SET) which is used to measure the endurance of the shoulder muscle strength. Treatment in the form of a kettlebell exercise model with the set system method was given to the experimental group for eight weeks. Based on the results of the study, it can be concluded that the kettlebell training model with the set system method has a significant effect on increasing the endurance of the female wrestling athletes' shoulder muscle strength. In addition, the kettlebell training model with the set system method provides a greater percentage increase in the endurance of the female wrestling athletes' shoulder muscle strength.

How to Cite

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✉ Correspondence address :

E-mail: aridwiryatna@gmail.com

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INTRODUCTION

The sport of wrestling has been an interesting research topic for the last 50 years or so (Kramer et al., 2001). Research conducted on the sport of wrestling is very diverse, both technical and physical. In this study, the authors specifically highlight the phenomena that exist in female wrestling athletes. In the implementation of training, female wrestling athletes are often underestimated due to various things, such as the inability to perform the same movements as male athletes and not infrequently also related to gender issues which are very hot in Indonesia (Berliana et al., 2021). In particular, the authors observed the physical ability of female wrestling athletes. The author sees that female wrestling athletes have fairly good physical abilities for their size, but often the coaches are still not satisfied with that. So it is not uncommon for female athletes to be given additional physical training from male athletes and there are differences in strength training (Roberts et al., 2020; Zach & Adiv, 2016).

The author sees from several cases of recent wrestling matches that women's wrestling athletes often make mistakes in slamming techniques, especially when the match has been running a few minutes or near the end of time. This movement error is caused by a weakening of body strength, one of which is shoulder muscle athletes. This results in athletes not being able to slam well because they do not have a prefix to slam well too. When a wrestling athlete is not able to slam well, the chances of the athlete winning will be smaller because the points earned are also small. One of the initial movements for slamming is to lift the opponent's body which is supported by the strength of the shoulder muscles, if the athlete does not have good strength endurance in that part, then he will experience a loss because the shoulder muscles are one of the key components in wrestling (Podlivaev et al., 2019).

The athlete's inability to perform a technique can be caused by the lack of maximum ability of the athlete's physical condition which specifically in this study is related to the strength endurance component (Harsono, 2018). To support this, training with the right guidelines is needed so that improving the ability of physical conditions can be achieved efficiently (Clayton et al., 2015; Sands et al., 2012). Many methods and training models are used to help improve the physical condition of athletes other than traditional/conventional methods (Maki et al., 2021). One model that is currently popular and classified is the kettlebell training model (Eckert & Snarr,

2016; Levine et al., 2020). The kettlebell training model is proven to be able to improve a person's physical condition, especially the strength component. This is in line with the results of a systematic review which stated that the kettlebell training model is safe and effective for increasing functional strength and certain strength measures and can show positive results with postural control in young and healthy samples (Girard & Husain, 2015).

Previous studies have also suggested that the kettlebell training model can provide more benefits that are not usually seen in conventional weight training models (Beltz et al., 2013). The kettlebell training model is believed to be more capable of providing motion innovation so that the range of benefits obtained is maximized. The use of the kettlebell training model can be an alternative form of strength training and adaptation for coaches who are interested in increasing the strength and power of their athletes (Otto et al., 2012). The kettlebell exercise model itself has been used in the training process in recent years, but it has not been maximized because people who do it still have limited knowledge regarding the benefits, forms of movement, and load manipulation in the implementation of the exercise.

Research related to kettlebells in Indonesia is also still very rarely found even though interest in this exercise model is quite high (Ramadhan & Sunaryadi, 2019; Susilo, 2019), so that coaches, especially in the sport of wrestling, seem to overrule this exercise model. This is unfortunate because this exercise model has been scientifically proven to have significant benefits for the physical condition of athletes (Beltz et al., 2013; Levine et al., 2020; Otto et al., 2012). In addition, research related to the strength component often only focuses on the exercise model and pays less attention to the training method used (Mirzaei et al., 2012). However, in this study, the authors used a set system exercise model that has often been used in previous strength training (Weakley et al., 2017). In addition to the obvious benefits of this method, the choice of this method is also due to the efficiency and convenience for athletes in carrying out their training programs (Arazi et al., 2021). Thus, this study aims to examine the effect of the kettlebell training model on increasing the endurance of the shoulder muscle strength of female wrestling athletes.

METHODS

The method used in this study is an experimental method with a randomized pretest-posttest

control group design (Fraenkel et al., 2012). The sample in this study were 8 KBB female wrestling athletes with a biological age of 20 ± 1.07 and a training age of 6.38 ± 2.33 . Samples were taken using a total sampling technique from the population, which were then divided into two groups (experimental and control). The author chose the sample because it was the research problem that the author stated earlier. The instrument used in this study is The Shoulder Endurance Test (SET) which is used to measure the endurance of shoulder muscle strength (Decleve et al., 2021). This instrument was given twice to the sample before and after being given treatment.

In this study, each group consisted of four athletes, then the experimental group was given treatment in the form of a kettlebell exercise model with the set system method and the control group was given treatment in the form of a conventional strength training model. Treatment was carried out for 8 weeks with a frequency of 2 sessions/week (Beltz et al., 2013; Otto et al., 2012). Each session lasts 90 minutes consisting of warming up (15 minutes), main exercise (60 minutes), and cool down (15 minutes). The treatment of the kettlebell exercise model with the set system method is arranged in an exercise program that has previously been consulted with experts. The exercise program contains several forms of movement, each of which is performed for 15 repetitions x 3 sets with a rest duration of 60-90 seconds between sets. These movements consist of swings, deadlifts, cleans, shoulder presses, up-rows, snatches, Turkish get-ups, front raises with a load of 10-12 kg. After the data was obtained, the authors carried out data processing and analysis using SPSS version 24 by using the t-test as a hypothesis test (Santoso, 2017).

RESULTS AND DISCUSSION

Based on the results of data processing and analysis, the data are then described and presented in **Table 1**.

Table 1. Statistical Descriptive

Group		Mean	Std. Dev.	Min.	Max.
Experiment	Pre	32.75	9.179	21	41
	Post	39.25	7.719	30	47
Control	Pre	33.75	4.924	28	40
	Post	33.00	4.320	29	39

Table 1 shows a description of the statistical data in the form of the average value, standard deviation, the lowest value, the highest value, and the number of values.

Table 2. Normality Testing

Group		Sig.	Information
Experiment	Pre	0.532	Normal
	Post	0.701	Normal
Control	Pre	0.860	Normal
	Post	0.577	Normal

Table 2 shows the results of the normality test using the Shapiro-Wilk Test. All data > 0.05 so that the data is declared "Normal Distributed".

Table 3. Hypothesis Testing

Group	t Score	Sig. (2-tailed)	Information
Experiment	7.506	.005	H0 rejected
Control	1.192	.319	H0 accepted

Table 3 shows the results of the Paired Samples t-Test. The experimental group obtained a score of 7.506 with Sig. (2-tailed) of $0.005 < 0.05$ so that H0 is rejected, which means that there is a significant effect of the kettlebell training model with the set system method on increasing the endurance of the shoulder muscle strength of female wrestling athletes. While the control group obtained a score of 1.192 with Sig. (2-tailed) of $0.319 > 0.05$ so that H0 is accepted, which means that there is no significant effect of conventional training models on increasing endurance of shoulder muscle strength in female wrestling athletes.

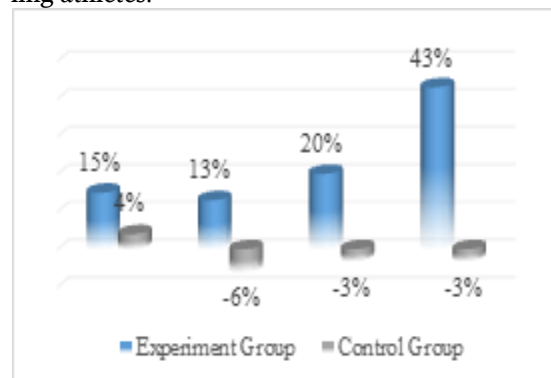


Figure 1. Bar Percentage

Figure 1 shows the percentage increase that occurred in each sample. In the experimental group, each sample experienced an increase in results ranging from 13-43% which overall had a percentage increase of 23%. While in the control group, there was only one sample that experienced an increase in yield (4%) and the others experienced a decrease from 3-6% which overall had a percentage decrease of 2%. This shows that the kettlebell training model with the set system method is proven to be effective in increasing the endurance of the female wrestling athletes' shoulder.

der muscle strength.

In the process of achieving maximum performance, an athlete needs optimal conditions both psychologically and physiologically to achieve maximum performance (Simbolon et al., 2020). Specifically, on the physiological aspect, the author highlights the physical condition in which an athlete must have an excellent physical condition in all components to support his appearance. In the sport of wrestling, the strength component has an important point to be able to display maximum performance (Kraemer et al., 2004). The strength of a wrestling athlete will serve to lift and slam opponents when they are fighting. Wrestling athletes already have good strength abilities, but these strength abilities tend to disappear when the match has been running for some time.

This study shows that there is a significant effect of the kettlebell training model with the set system method on increasing the endurance of the shoulder muscle strength of female wrestling athletes. The results of this study are in line with previous studies which suggested that the kettlebell exercise model had a significant effect on strength, power, and endurance (Girard & Hussain, 2015; Otto et al., 2012). In addition, the percentage increase that occurred was greater in the experimental group using the kettlebell training model with the set system method than the control group using conventional weight training exercises. This result is different from previous research which suggested that the increase in strength using weightlifting was greater than kettlebell training (Otto et al., 2012). So that the results of this study can be a novelty in related fields.

In addition to the training model used, the increase in the endurance of the female wrestling athletes' shoulder muscle strength also occurs because of the manipulation of the training methods used. Usually, coaches often only focus on one, be it the training model or the training method. However, it is different from this research which focuses on the exercise model and the training method used. The set system training method is an exercise method using the same number of repetitions in each set and a load that is not too heavy (moderate) which is 60% of 1RM (Schoenfeld et al., 2021). Setting the load that is not too heavy allows athletes to perform movements in a large number of repetitions (15+), unlike the hypertrophy or pyramid system methods (Harsono, 2018; Schoenfeld et al., 2015, 2021; Weakley et al., 2017).

The application of the kettlebell training

model with the set system method for female wrestling athletes is very appropriate because it uses media that is considered safer than training using weights in the form of bars and plates that are commonly used (Maki et al., 2021). Therefore, women's wrestling athletes can still carry out strength training in a different way from men's wrestling athletes but still have positive benefits, even better to increase the endurance of shoulder muscle strength. Women's wrestling athletes don't need to worry and be afraid anymore to carry out strength training using external weights which are still considered dangerous for female athletes (Zach & Adiv, 2016). So that female athletes, especially in the sport of wrestling, are not secondary (Berliana, 2014). This research is still limited to the intervention and the sample used. The author recommends conducting further research that can compare the components of strength in female athletes with different sports.

CONCLUSION

Based on the results of the study, it can be concluded that the kettlebell exercise model with the set system method has a significant effect on increasing the endurance of the female wrestling athletes' shoulder muscle strength. In addition, the kettlebell training model with the set system method provides a greater improvement than conventional exercises on the endurance of the female wrestling athletes' shoulder muscle strength. This training model is very useful if applied in the training process because it has been scientifically proven.

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