

## RESEARCH ARTICLE

## EFFECTS OF KETTLEBELL HIGH-INTENSITY INTERVAL TRAINING (HIIT) PROTOCOL ON UPPER-BODY POWER

1. Ph.D. Scholar Sports Sciences & Physical Education. The University of Lahore. Pakistan
2. Professor Department of Sports Sciences & Physical Education Faculty of Allied Health Sciences The University of Lahore. Pakistan
3. Lecturer, Department of Physical Education and Sports, Abdul Wali Khan University Mardan Pakistan.
4. Assistant professor, Health & Physical Education Higher Education Department Punjab. Pakistan
5. Lecturer, Department of Education, NUML University. Islamabad. Pakistan

## Correspondence

Ismat Ullah  
Ph.D. Scholar Sports Sciences & Physical Education,  
the University of Lahore. Pakistan.  
E-mail: mahrismat@gmail.com

Received on: 8-8-2021

Revision on: 28-9-2021

Published on: 31-12-2021

**Citation;** Ullah I, Marwat MK, Rizwan I, Shah M, Jamshaid F, Yousuf MS. Effects of kettlebell high-intensity interval training (HIIT) protocol on upper-body power. *T Rehabil. J.* 2021;05(02):226-229  
soi: [21-2017/re-trjvol05iss02p226](https://doi.org/10.52567/trj.v5i02.60)  
doi: <https://doi.org/10.52567/trj.v5i02.60>

**Ismat Ullah**<sup>1</sup>: Conception, data collection, writing; revised and accountable for all aspects

**Mohibullah Khan Marwat**<sup>2</sup>: Revised and accountable for all aspects

**Muhammad Shah**<sup>3</sup>: Interpretation of data, Revised and accountable for all aspects

**Fozia Jamshaid**<sup>4</sup>: Revised and accountable for all aspects

**Iqra Rizwan**<sup>5</sup>: Interpretation of data, Revised and accountable for all aspects

**Manzar Shabab Yousuf**<sup>1</sup>: Conception, Revised and accountable for all aspects

## ABSTRACT

**Background:** Upper body powers are the major fitness component of majorities of games which is necessary to improve. Kettle bell swing stimulus for upper body performance is little unique, that is sufficient to increase both maximum strengths with explosive execution. **Objective:** To evaluate the effects of kettlebell high-intensity interval training protocol on upper body power. **Method:** The randomized control trials (RCT) on amateur athletes were conducted at I-8 Active Gym at I-8 Markaz Islamabad Pakistan after approval from CEO. Data was collected through non probability convenience sampling technique. A total of n=40 volunteer amateur athletes were recruited without neuromuscular injury in the last 6 months and randomly divided experimental and control groups. The experimental group received Kettlebell Exercises and the participants in the control group, on the other hand, went about their regular lives without engaging in any fitness training. Subjects were assessed before and after 12 weeks using Medicine ball throw tests, measured by distance covered in centimetre (cm) for upper body explosive power. The medicine ball throw test was used to upper body strength. All statistical analyses were calculated by the SPSS statistical package. **Result:** The mean age of the study participants was 21.66 ±1.71. The mean weight and height were 62.55±4.04 kg and 5.78±0.14 feet respectively. All participants were in the normal BMI range (20.11±0.62). Both groups were comparable at the baseline (p>0.05) in upper body strength. While after 8<sup>th</sup> week experimental group showed more significant improvement with large effect size (95.94±9.52 ver. 83.60±11.20, MD=12.34, p=0.001, d=1.07) in upper body power as compare to control group. **Conclusion:** The Kettle Bell High Intensity Interval Training (KB-HIIT) program is beneficial for enhancing upper body explosive strength.

**Keywords:** High Intensity Interval Training, kettle bell exercises, power, strength.

## INTRODUCTION

Traditional strength training techniques include bodyweight training and formal weight lifting. In the past few decades, High-intensity interval training (HIIT) has become more common in exercise programs.<sup>1</sup> Previous researches have concentrated on muscle strength and endurance training as strength training has become more prominent. Kettle bells (KB) is a fitness modality that has been found to induce high physiological demands, such as a rapid increase in heart rate and a large amount of energy consumption. Exercise with kettlebells is an alternative to functional power and strength workouts.<sup>2,8</sup> Players can train greatly and with absolute satisfaction when they know that they will not get injured and will get lot of benefits. Muscle strength, flexibility, and/or aerobic ability have all been measured in previous studies on KB fitness. Lake and Lauder discovered that KB increased explosive ability to match the increased demands exerted on the body<sup>(1)</sup>. The muscles have been suggested during the kettlebell swing, as the beneficial technology for neuromuscular training.<sup>14</sup>

Some studies have looked at the muscular activation and load of a single kettlebell session, although the numbers are small.<sup>3,4,5</sup> While the kettlebell swing exercise had a higher peak and mean power, according to the researchers kettlebell swinging improves maximal and explosive strength as well as improvements in aerobic ability as determined by a VO<sub>2</sub> Max test, which confirmed the use of KB as a successful model of training.<sup>3</sup> KB swing training has previously been shown to increase rapid lower body force development, but not much conventional weight training movements.<sup>2</sup> Upper body powers are the major fitness component of majorities of games which is necessary to improve. Kettlebell swing stimulus that is sufficient to increase both maximum strengths with explosive execution, which offers a useful alternative to strength and conditioning professionals seeking variety for their athletes.<sup>3</sup> Literature explained lower body strength and muscular strength, but using kettle bell for upper body performance is little unique. Currently nonstandard training program was used to improve upper body strength and explosive power in

Pakistan. Hence the search for easy fitness techniques always remains on priority for the athletes. KB training technique is easy and safe to train but the benefits of the KB are needed to be explored in Pakistani athletes. So objective of the study was to evaluate the effects of kettlebell high-intensity interval training protocol on upper body power.

## METHODOLOGY

This study was the randomized control trials (RCT) on amateur athletes. Data was collected through

non probability convenience sampling technique. The duration of this study was 12 weeks after approval from the CEO of I-8 Active Gym at I.8 Markaz Islamabad Pakistan. .

For this study, n=40 volunteer amateur athletes were recruited without neuromuscular injury in the last 6 months and randomly divided experimental and control groups. The experimental procedures used in this study were approved by the Board of studies, Project Evaluation Committee (PEC), Institution Review Board (IRB), and BASR of the University of Lahore, Pakistan.

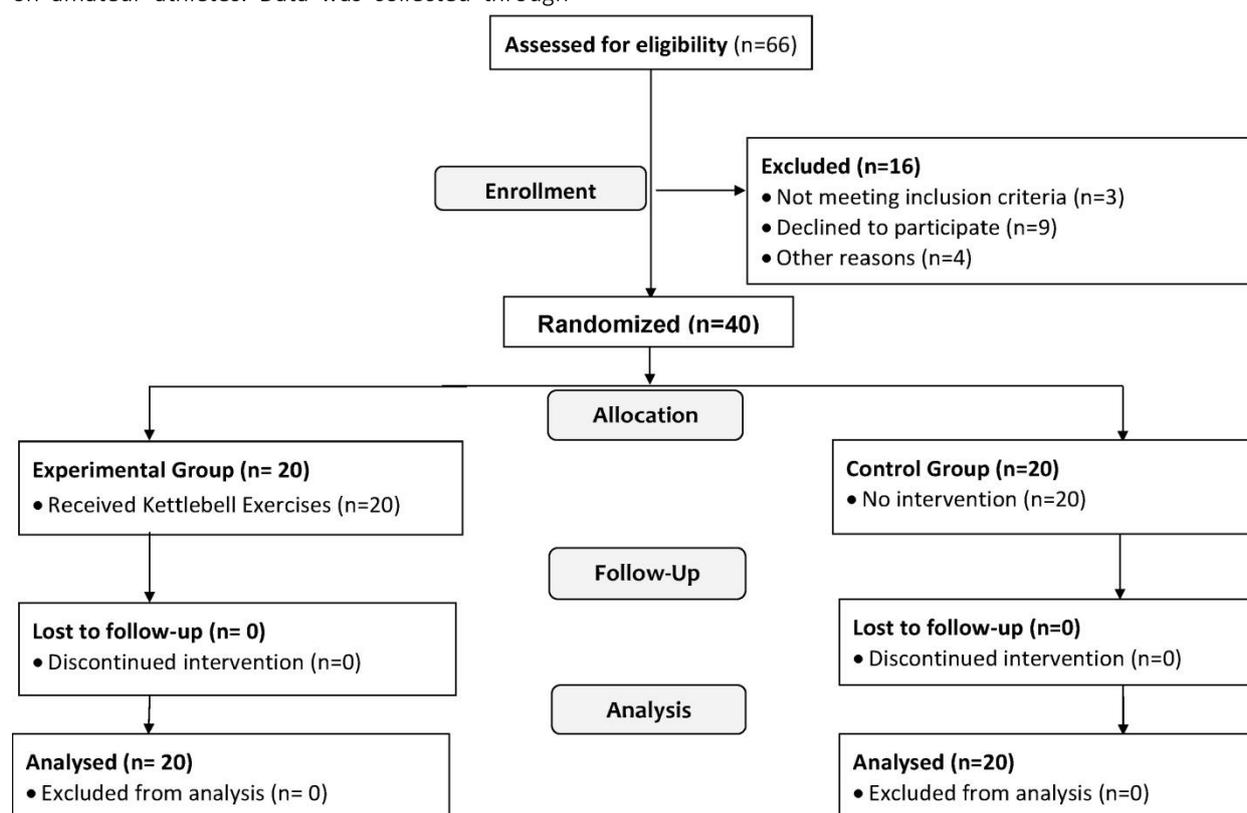


Figure 1: CONSORT diagram

The experimental group received Kettlebell Exercises high intensity training (KB-HIIT) including Kettlebell deadlift, Two-handed kettlebell swing, Kettlebell clean, One-arm kettlebell snatch, and front squat with a jump. The initial weight for four weeks was 12 kg and after that 18 kg was used till 8th week, at 1:2 work to rest ratio. For each exercise 5 repetitions were performed with 25 seconds hold. Between the each repetition 50 second rest was given. The participants in the control group, on the other hand, went about their regular lives without engaging in any fitness training. Subjects were assessed before and after

12 weeks using Medicine ball throw tests, measured by distance covered in centimetre (cm) for upper body explosive power. The test performed by keeping the back in contact with the wall, as the strength of only the arms was tested. The medicine ball through test was followed by general warm-up that consisted of running, calisthenics, and stretching.

All statistical analyses were calculated by the SPSS statistical package. The results were reported as means and standard deviations (SD), mean difference (MD), For statistical significance level of significance was set at  $p < 0.05$  and for practical

significance effect size (Cohen's d) was calculated. As data was normally distributed with-in and

## RESULTS

The mean age of the study n=40 participants was 21.66 ±1.71. The mean weight and height were 62.55±4.04 kg and 5.78±0.14 feet respectively. All participants were in the normal BMI range (20.11±0.62).

between subjects analysis paired sample t-test and independent sample t-test was used respectively.

After Two months of intervention pre-post analysis of kettlebell training showed significant improvement in upper body power (UBP) with large effect size (83.09±9.98 ver. 95.94±9.52, MD=12.85,  $p<0.001$ ,  $d=1.58$ ). While in control group no significant change ( $p\geq 0.05$ ) observed. (Table 1)

**Table 1: Pre-post analysis in upper body strength and explosive power**

		Mean	SD	MD	p-value	Cohen's d
Experimental	Pre	83.09	9.98	12.85	0.000***	1.58
	Post	95.94	9.52			
Control	Pre	83.69	11.74	0.09	.730	0.07
	Post	83.60	11.20			

Significance Level:  $p<0.05^*$ ,  $p<0.01^{**}$ ,  $p<0.001^{***}$ .

Both groups were comparable at the baseline ( $p\geq 0.05$ ) in upper body strength. While after 8<sup>th</sup> week experimental group showed more significant

improvement with large effect size (95.94±9.52 ver. 83.60±11.20, MD=12.34,  $p=0.001$ ,  $d=1.07$ ) in upper body power as compare to control group. (Table 2)

**Table 2: Comparison between the upper body power**

		Mean	SD	MD	p-value	Cohen's d
Pre	Experimental	83.09	9.98	0.59	0.86	0.05
	Control	83.69	11.74			
Post	Experimental	95.94	9.52	12.34	0.001**	1.07
	Control	83.60	11.20			

Significance Level:  $p<0.05^*$ ,  $p<0.01^{**}$ ,  $p<0.001^{***}$ .

## DISCUSSION

The objective of this study was to evaluate kettlebell high-intensity interval training (KB-HIIT) protocol could boost upper body explosive strength. KB-HIIT following the given protocol improved upper body power in current study.

There are number of studies which explained lower body and muscular strength. Although it is generally established that weightlifting may improve upper body strength, it appears that kettlebell training can be just as beneficial.<sup>6, 7, 9, 10, 15</sup>

Maulit MR et al. researches in 2017 found that kettlebell swing is effective for improving performance.<sup>9</sup> McBride et al. previously discovered that training velocity and weight lifted are significantly associated with strength and power development. Slower motions build strength while quicker moves enhance velocity.<sup>10</sup>

Kettlebell training is also used for explosive power improvements.<sup>3</sup> Kettlebell training has been

utilized in physical fitness and sport performance facilities to increase both aerobic capacity/power and maximum and explosive strength.<sup>1, 13</sup>

Andersen and his colleagues studied the activation of core muscles in one-armed and two-armed kettlebell swings. They discovered that in 1-armed and 2-armed kettlebell swings, the electromyographic activity of the rectus abdominis, oblique external, and lower and upper erector spinae on both sides of the trunk improved.<sup>11</sup>

Kettlebell exercises were studied by Lake et al to determine their impact on maximal and explosive strength levels. Six weeks were spent doing either kettlebell training or jump squat power training by the participants in this study. As a result of kettlebell training, maximum strength increased by 9.8%, and explosive strength increased by 19.8%. The use of kettlebells as a training tool is a viable alternative to functional strength and power exercises.<sup>8</sup> Faigenbaum AD et al investigated the

impact of various resistance training protocols on the development of upper-body strength and local muscular endurance in youngsters. They also saw an increase in upper-body strength.<sup>12</sup>

According to Chen HT et al, Kettlebell training enhances the sarcopenia index, grip strength, and back strength in older adults with sarcopenia. As a result, kettlebell training may elicit adequate cardiovascular, neuromuscular, and metabolic responses to enhance strength, aerobic power, and total physical fitness.<sup>13</sup> For these reasons, several strength and conditioning specialists have advocated for the use of kettlebell training as a valuable tool for improving muscle strength, power, and maximal oxygen absorption.<sup>1,13</sup>

Finally, using the identical workout routine as in the RCT, a kettlebell practitioner may enhance both cardiorespiratory fitness and muscular strength. Furthermore, given that traditional strength training devices (barbells) and exercise facilities (gyms) can be costly and deter beginners, kettlebell exercise may be a more affordable and accessible strength and aerobic training alternative to increase and maintain physical fitness related to cardiorespiratory health, power and strength performance, and with low cost (for coach and/or participant). In this study, the sample involved was amateur athletes from different games, and there is a possibility that study variable could vary in other athletic populations differently.

## CONCLUSION

The Kettle Bell High Intensity Interval Training (KB-HIIT) program is beneficial for enhancing upper body explosive strength. KB training can be healthy and convenient fitness modalities that add value to an athlete's workout. The future study must be carried out in multiple setting with large sample size. The effect of KB-HIIT on physical fitness components in game must be evaluated in future studies with larger sample and different games for generalizability of the results

## REFERENCES

1. Falatic JA, Plato PA, Holder C, Finch D, Han K, Cisar CJ. Effects of Kettlebell Training on Aerobic Capacity. *J Strength Cond Res.* 2015;29(7):1943-7. doi: 10.1519/JSC.0000000000000845.
2. Otto WH 3rd, Coburn JW, Brown LE, Spiering BA. Effects of weightlifting vs. kettlebell training on vertical jump, strength, and body composition. *J Strength Cond Res.* 2012;26(5):1199-202. doi: 10.1519/JSC.0b013e31824f233e.

3. Lake JP, Lauder MA. Kettlebell swing training improves maximal and explosive strength. *J Strength Cond Res.* 2012;26(8):2228-33. doi: 10.1519/JSC.0b013e31825c2c9b.
4. McGill SM, Marshall LW. Kettlebell swing, snatch, and bottoms-up carry: back and hip muscle activation, motion, and low back loads. *J Strength Cond Res.* 2012;26(1):16-27. doi: 10.1519/JSC.0b013e31823a4063.
5. Zebis MK, Andersen CH, Bencke J, Ørntoft C, Linnebjerg C, Hölmich P, Thorborg K, Aagaard P, Andersen LL. Neuromuscular Coordination Deficit Persists 12 Months after ACL Reconstruction But Can Be Modulated by 6 Weeks of Kettlebell Training: A Case Study in Women's Elite Soccer. *Case Rep Orthop.* 2017;2017:4269575. doi: 10.1155/2017/4269575.
6. Jay K, Jakobsen MD, Sundstrup E, Skotte JH, Jørgensen MB, Andersen CH, Pedersen MT, Andersen LL. Effects of kettlebell training on postural coordination and jump performance: a randomized controlled trial. *J Strength Cond Res.* 2013;27(5):1202-9. doi: 10.1519/JSC.0b013e318267a1aa.
7. Manocchia P, Spierer DK, Lufkin AK, Minichiello J, Castro J. Transference of kettlebell training to strength, power, and endurance. *J Strength Cond Res.* 2013;27(2):477-84. doi: 10.1519/JSC.0b013e31825770fe.
8. Williams BM, Kraemer RR. Comparison of Cardiorespiratory and Metabolic Responses in Kettlebell High-Intensity Interval Training Versus Sprint Interval Cycling. *J Strength Cond Res.* 2015;29(12):3317-25. doi: 10.1519/JSC.0000000000001193.
9. Maulit MR, Archer DC, Wong MA, Brown LE, Coburn JW, Galpin AJ et al. Effects of kettlebell swing vs. explosive deadlift training on strength and power. *Int J Kine Sports Sci.*;5(1):1-7. doi: <http://dx.doi.org/10.7575/aiac.ijks.v.5n.1p.1>
10. McBride JM, Triplett-McBride T, Davie A, Newton RU. The effect of heavy- vs. light-load jump squats on the development of strength, power, and speed. *J Strength Cond Res.* 2002;1(1):75-82.
11. Andersen V, Fimland MS, Gunnarskog A, Junggård GA, Slåtland RA, Vraalsen ØF, Saeterbakken AH. Core Muscle Activation in One-Armed and Two-Armed Kettlebell Swing. *J Strength Cond Res.* 2016 (5):1196-204. doi: 10.1519/JSC.0000000000001240.
12. Faigenbaum AD, Loud RL, O'Connell J, Glover S, O'Connell J, Westcott WL. Effects of different resistance training protocols on upper-body strength and endurance development in children. *J Strength Cond Res.* 2001;15(4):459-65.
13. Chen HT, Wu HJ, Chen YJ, Ho SY, Chung YC. Effects of 8-week kettlebell training on body composition, muscle strength, pulmonary function, and chronic low-grade inflammation in elderly women with sarcopenia. *Exp Gerontol.* 2018;112:112-118. doi: 10.1016/j.exger.2018.09.015.
14. JaeHa Lim, MinJoon Kim, JinSeop Kim, JiHeon Hong, DongYeop Lee, JaeHo Yu. Core and Lower limb Activations of the two-handed and Single-Handed Kettlebell Exercises. *Research J. Pharm. and Tech.* 2018; 11(3): 1101-1106. doi: 10.5958/0974-360X.2018.00207.X
15. Glenn JM, Gray M, Wethington LN, Stone MS, Stewart RW Jr, Moyen NE. Acute citrulline malate supplementation improves upper- and lower-body submaximal weightlifting exercise performance in resistance-trained females. *Eur J Nutr.* 2017;56(2):775-784. doi: 10.1007/s00394-015-1124-6.

**Disclaimer:** None to declare.

**Conflict of Interest:** None to declare.

**Funding Sources:** None to declare.