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Effect Of Cross Fit Training On Cardiorespiratory Fitness In Female Wrestler: A Case Study

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ABSTRACT

Introduction: In India, wrestling is a beloved sport that has been performed since ancient times. Traditionally, it has been known as "Pehlwani" and is performed on a field of dug soil in akhadas. The prevention of high-level performance and athletic injuries prior to sporting loads is achieved by performing the proper exercises. Exercise is a method used in sporting activities to increase an athlete's ability.

Purpose: The research might provide criteria to recognize capability in games and developing corrective and quality training plans.

Objective: To evaluate the effect of cross fit training on cardiorespiratory fitness in female wrestler.

Methodology: The present study was a case study conducted on female wrestler at sports academy in Hisar, Haryana. The anthropometric traits of the participants included age (18 years), weight (52kg) and height (158cm) were measured at the baseline visit. The cross fit training were given for 3 days a week for alternate days for 6 weeks. The subject performed a graded treadmill exercise test to estimate VO_2 max.

Results: To evaluate the effectiveness of cross fit training, mean changes from baseline to end of the study in VO_2 max were taken into consideration as the main outcome. The cross fit training significantly improved Vo_2 max (pre training=53.48± 4.60 and post training=65.45± 4.67).

Conclusion: After six weeks of CrossFit training, the female wrestler showed a significant improvement in VO_2 max, indicating better cardiorespiratory fitness and enhanced athletic performance potential.

Keywords: “Cross fit training”, “Female Wrestler”, “Cardiorespiratory fitness”

Introduction

Wrestling is a popular sport that has been practiced since ancient times in India. It has historically been called "Pehlwani" and is carried out in an akhadas field of excavated earth (Agarwal et al., 2020). By doing the right exercises before sporting loads, high-level performance and athletic injuries can be avoided. Professional and governmental organizations have been highlighting the value of physical activity in recent years, as well as its role in health maintenance, improvement, and prevention (Garber et al. 2011; Kliszczewicz et al., 2014). Exercise is a strategy used in athletics to improve an athlete's performance.

CrossFit is a group-based high-intensity interval training (HIIT) program that combines strength and aerobic workouts with an emphasis on functional (multi-joint) motions, among all these new "tendencies" or activities (Smith et al., 2013; Jaime et al., 2015). The metabolic and cardiovascular reactions to the CrossFit workout. CrossFit is a rapidly expanding fitness sport that may be used for both recreational and general exercise training. Numerous aspects of health, including skeletal muscle strength, cardio-respiratory function, and metabolic management, have been demonstrated to improve with physical activity (Garber et al., 2011).

A significant portion of this expansion can be ascribed to alleged claims of quick weight loss and improved cardiovascular capacity (Smith et al., 2013), in addition to providing a variety of quick workouts. (Kliszczewicz and colleagues., 2014). CrossFit states that programming must include both resistance (such as deadlift, power clean, snatch, etc.) and endurance (such as running, rowing, cycling, etc.) modalities in a single bout in order to train across a wide spectrum of physical fitness components (such as strength, power, and endurance) within one exercise scheme (Glassman 2002; Glassman 2007).

CrossFit has become popular for a number of reasons, including its easy programming accessibility, low time investment, and greater level of enjoyment than traditional training (Heinrich et al., 2014). Nevertheless, not much study has been done to record the physiological reactions during CrossFit exercises, despite its popularity in the fitness community. Accordingly, studies have demonstrated that CrossFit produces both a large increase in fitness levels (i.e., aerobic and anaerobic performance) and a high acute cardiovascular training response (Paine et al., 2010; Smith et al., 2013; Butcher et al., 2015; Jaime et al., 2015).

CrossFit WODs typically employ one of two training structures: 1) the maximum number of series (or rounds) performed in a set amount of time, also referred to as "as many repetitions as possible" (AMRAP); and 2) a "all-out" session with a set number of rounds completed in the shortest amount of time within a time cap, also referred to as "round for time" (RFT) (Timon et al., 2019; Forte et al., 2022). Although both AMRAP and RFT structures must withstand significant energy demands, little is known about how they specifically affect cardiovascular and metabolic responses.

Few studies have examined how various CrossFit WODs affect physiological variables as heart rate, blood lactate concentration, rate of perceived effort, and Vo_2 (Kliszczewicz et al., 2014; Butcher et al., 2015; Mate et al., 2017; Mate et al., 2018; Tibana et al., 2018; Forte et al., 2022). By using high-intensity exercises and metabolic conditioning, which test the cardiovascular system and promote endurance, CrossFit training dramatically enhances cardiorespiratory fitness. Preventing high-level performance and athletic injuries before sporting loads is accomplished by performing the appropriate exercises. These workouts raise heart rate, increase oxygen consumption, and enhance the body's capacity to deliver oxygen to muscles and eliminate waste products (Gelen et al., 2012; Ari et al., 2021).

Exercise is a technique used in sports to improve an athlete's performance, emphasizing their ability to achieve the time limit and their systematically gained skills (Busch et al., 2013). Power, velocity, endurance, accuracy, agility, balance, coordination, cardiovascular endurance, flexibility, and strength are the ten key components that are commonly included in cross-fit training (Butcher et al., 2015; Caloglu et al., 2020).

Purpose

While the majority of research has focused on the technical and tactical maneuvers and competitive activities of skilled and elite fighters (Basar 2014; Demirkan et al. 2014; Arakawa et al. 2020; Cieslinski et al., 2021), it is still important to address the issue of enhancing wrestlers' functional readiness and physical fitness during the initial stages of basic training. The study's findings may offer standards for identifying skill in sports and gaming. It could help athletes, personal trainers, and physiotherapists create high-quality training in addition to creating remedial training plans. Trainers and athletes may benefit from the study's insights on physical fitness components, such as cardiorespiratory fitness.

Material and Methods

The present study was a case study conducted on female wrestler at sports academy in Hisar, Haryana. Ethical approval for the study was obtained. Before participating, the subject read and signed an informed consent statement.We obtained the data during two phases, the baseline and after the training. The anthropometric traits included body weight, height, and the physical fitness were measured at the baseline visit.The participant in the present study has weight 52kg and 158cm height and performed a graded treadmill exercise test to estimate Vo_2 max. The cross fit training were given for 3 days a week for alternate days for 6 weeks.

Procedure of the training:

The participants in the "Cindy" model used their body weight to complete five chin-ups, ten push-ups and fifteen squats without breaks for a total of twenty minutes. Participants in the "Fran" model executed a chin-up combo of a military press in a station technique and a front squat with two 10 kg dumbbells. The station started with 21 consecutive chin-ups after executing 21 front squats with the military press. After that, three series of 15, 9 and 2 repetitions of the identical exercise were done (Partridge et al., 2014; Butcher et al., 2015; Caloglu et al., 2020).

A) Cross fit Training (1st and 2nd Week) (Beilke et al., 2012):

The training program including 10 stations (1. Tire& sledgehammer (10 kg), 2.Crunch, 3.Burpee, 4.Hiper extension, 5.TRX- rowing, 6.Ab Roller crunch, 7.Rope swinging (each rope weight; 12 kg), 8.Tire flips (28 kg), 9.Skipping rope, 10.Dynamic plank stations) have been created. The participants have performed the movements according to movement rank in the stations. After the defined station has been implemented for 30 seconds, they have switched to the other station. The participants have made the performance in all stations 5 sets have been implemented in total 1-2 minutes rest between the sets has been given.

B) Cross fit Training (3rd and 4th Week) (Beilke et al., 2012):

The training program including 9 stations (1. Tire& sledgehammer (10 kg), 2.Crunch, 3.Burpees box jump over, 4.Hiper extension, 5.Ring dips, 6.Ab Roller crunch, 7.Rope swinging (each rope weight; 12 kg), 8.Air squat, 9.Dynamic plank stations) created by the participants has been performed circularly. After the defined station has been implemented for 45 seconds, they have switched to the other station. The participants have made the performance in all stations 6 sets have been implemented in total 1-2 minutes rest between the sets has been given.

C) Cross fit Training (5th and 6th Week) (Beilke et al., 2012):

The training program including 10 stations (Tire& sledgehammer (10 kg), 2.Hiper extension 3.Walking lunge (20 kg dumbbell on both hands), 4.Crunch, 5.Push Press (Olympic Bar + place; 25 kg), 6.Box jumps (40 cm), 7. TRX push up, 8.Ab Roller crunch, 9. Rope swinging (each rope weight; 12 kg), 10. Tire flips (28 kg)) created by the participants has been performed circularly. After the defined station has been implemented for 45 seconds, they have switched to the other station. The participants have made the performance in all stations. 6 sets have been implemented in total1-2 minutes rest between the sets has been given.

Result

Outcome measure	Pre-test	Post-test
Cardiorespiratory fitness (Vo_2 max)	53.48± 4.60	65.45± 4.67.

Table: 1.1

The wrestler's VO_2 max improved significantly after 6 weeks of CrossFit training. This means her aerobic capacity and endurance improved, and her body became more efficient at using oxygen during exercise. The increase of about 12 $ml \cdot kg^{-1} \cdot min^{-1}$ (around 22% improvement) shows a strong positive effect of CrossFit training on her fitness.

Discussion

Wrestling is a physically demanding sport that relies heavily on anaerobic energy systems, with key performance determinants including strength, speed, flexibility, coordination, and both muscular and cardiovascular endurance (Akgun et al., 1986; MacDougall et al., 1993; Gokdemir et al., 2000; Alpay et al., 2006; Drake et al., 2018). In recent years, high-intensity functional training programs like CrossFit have gained attention for their potential to improve multiple fitness domains relevant to combat sports, yet limited research has focused specifically on wrestlers.

The present study showed a significant improvement in the subject's VO_2 max following a 6-week CrossFit training protocol. This finding indicates enhanced aerobic capacity, which plays a critical role in supporting recovery between high-intensity efforts, delaying fatigue, and improving overall endurance. These results support earlier findings that consistent CrossFit training performed 2–3 times per week can produce meaningful cardiovascular adaptations (Smith et al., 2013).

CrossFit's structure—integrating resistance and metabolic conditioning in varied formats like AMRAP or RFT—places substantial demand on the cardiovascular and muscular systems (Forte et al., 2022). The use of multi-joint, functional movements, as incorporated in this study (e.g., tire flips, push press, TRX exercises), likely contributed to improved oxygen delivery and utilization across working muscle groups. The physiological response during such high-intensity exercise includes increased heart rate, enhanced sympathetic nervous activity, and recruitment of large muscle masses, which collectively stimulate improvements in VO_2 max (O'Leary et al., 1996; Forte et al., 2020).

Functional training forms the base of early-season conditioning in wrestling and is essential to increase the athlete's adaptive capacity (Odynets et al., 2024). This case study supports that CrossFit can be used effectively during the preliminary training phase to build endurance and resilience. Moreover, it complements traditional strength and conditioning programs by enhancing aerobic and anaerobic efficiency (Hak et al., 2013).

Injury prevention is another important consideration in wrestling, and functional strength programs such as CrossFit have shown potential in developing balanced musculature and proper movement mechanics (Grindstaff et al., 2006). This may contribute to reducing the risk of common wrestling injuries and enhancing performance longevity. Additionally, improving metabolic systems is crucial in managing the cumulative fatigue from year-round competition calendars (Kraemer et al., 2001; Utter et al., 2002; Boby et al., 2025).

Nevertheless, the findings should be interpreted with caution due to certain limitations. As a single-subject case study, the results cannot be generalized. The absence of a control group also limits the ability to determine whether the improvements were solely due to CrossFit training or influenced by other external variables such as nutrition or recovery practices.

Future research should explore the acute and long-term physiological and psychological effects of CrossFit training in wrestlers across different genders, age groups, and experience levels. Comparing CrossFit with traditional strength and endurance programs would further clarify its specific benefits in combat sports.

Conclusion

The present study provides greater insight into the physiological (e.g., HR, Vo_2 max) responses of CrossFit workouts. In order to avoid possible health problems caused by repetitive high-intensities and poor technique, it would be recommended to organize a more balanced programing of workouts, reducing the number of “dangerous” exercises, and also combine CrossFit WODs with aerobic-based training.

Limitation

The study involved only one participant, which limits the generalizability of the findings. Results from one individual cannot represent the broader population of female wrestlers. There was no control or comparison group. Without this, it's difficult to determine whether the improvements in VO_2 max were due solely to the CrossFit intervention or influenced by other factors (e.g., motivation, nutrition, rest).

Conflict of interest
The authors declare no conflicts of interest.

Data Availability Statement: The datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

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References

1. Agarwal S, Chhikara E, Rohilla RK. (2020). Pattern of Injuries in Indian Wrestlers. Indian J Musculoskelet Radiol, (2),97-103.
2. Akgün N. Exercise Physiology. Edition, 1986, vol. 1, pp. 60–198.
3. Alpay B., Hazar S. Comparison and Evaluation of Some Respiratory and Circulation Parameters of Turkish Wrestling National Team Athletes with Niğde University Wrestling Team Athletes. Journal of Physical Education and Sport Sciences, 2006, vol. 8, no. 3, pp. 25–33.
4. Arakawa H., Yamashita D., Arimitsu T., Kawano T., Wada T., Shimizu S. (2020), Body Composition and Physical Fit ness Profiles of Elite Female Japanese Wrestlers Aged 20 Years. Sports vol. 8, no. 6, p. 81.
5. Basar S. (2014), Differences in strength, flexibility and stabil ity in freestyle and Greco-Roman wrestlers. Journal of Back and Musculoskeletal Rehabilitation, vol. 27, pp. 321–330.
6. Beilke CB, Hetzel LM, Kreft BL, Pan L, Schroeder J (2012) The Effects of a cross fit training program on sport performance and body composition in young healthy adults. J Undergrad Kines Res 7: 21-33.
7. Boby, F. A, Salvi, N. M., Islam, M. Z., Vinu, W., Orhan, B. E., Citozi, R, Geantă , V. A. (2025). Impact of Circuit Training on Total Distance Covered and VO2 Max in National-Level Women Cricket Players. Retos, 69, 387–396.
8. Butcher, S. J., Neyedly, T. J., Horvey, K. J., & Benko, C. R. (2015). Do physiological measures predict selected CrossFit benchmark performance? Journal of sports medicine, 6, 241.
9. Cieslinski I., Gierczuk D., Sadowski J. (2021), Identification of success factors in elite wrestlers-An exploratory study. PLoS One, vol.16, no. 3, pp.125–130.
10. Demirkan E., Kutlu M., Koz M., Ozal M., Favre M. (2014), Physical Fitness Differences between Freestyle and Greco-Ro man Junior Wrestlers, Journal of Human Kinetics, vol. 8, no. 41, pp. 245–251.
11. Drake, N. B. (2018). Effects of heart rate variability-guided prescription on the physiological outcomes of crossfit training. International Journal of Exercise Science. Vol. 11(6), Article 25
12. Forte LDM, Freire YGC, Junior JSS et al. Physiological responses after two different CrossFit workouts. Biol Sport, 2022;39(2):231–236.
13. Garber, Carol Ewing, Bryan Blissmer, Michael R. Deschenes, Barry A. Franklin, Michael J. Lamonte, I-Min Lee, David C. Nieman, and David P. Swain. 2011. “Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults.” Medicine and Science in Sports and Exercise 43 (7): 1334–59.
14. Glassman G (2010) The cross fit Training guide. In: The CrossFit Journal. Cross fit, Inc, 1-27.
15. Gökdemir K. Scientific Basis of Wres tling Training. Poyraz offset, 2000, 15 p.
16. Grindstaff T.L., Potach D.H. Prevention of Common Wrestling Injuries. Strength & Con ditioning Journal, 2006, vol. 28, no. 4, pp. 20–28.
17. Hak PT, Hodzovic E, Hickey B (2013) The nature and prevalence of injury during cross fit training. J Strength Cond Res.
18. Heinrich, K. M., Patel, P. M., O'Neal, J. L., & Heinrich, B. S. (2014). High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. BMC Public Health, 14, 789. doi: 10.1186/1471-2458-14-789
19. Jaime Fernández-Fernández 1; Rafael Sabido-Solana 1; Diego Moya 2; Jose Manuel Sarabia 1; Manuel Moya1 ACUTE PHYSIOLOGICAL RESPONSES DURING CROSSFIT® WORKOUTS, European Journal of Human Movement, 2015: 35, 114-124
20. Kliszczewicz B, Snarr R, Esco M. Metabolic and Cardiovascular Response To the Crossfit Workout “Cindy”: a Pilot Study. J Sport Hum Perf. 2014;2(2):1–9.
21. Kliszczewicz, B., Snarr, RL., and Esco, M.. Metabolic and cardiovascular response to the CrossFit workout ‘Cindy’: A pilot study. J Sport Human Perf 2014;2(2):1-9.
22. Kraemer W.J., Fry A.C., Rubin M.R., Triplett-McBride T., Gordon S.E., Koziris L.P., Fleck S.J. Physiological and Performance Res ponses to Tournament Wrestling. Medicine and Science in Sports and Exercise, 2001, vol. 33, no. 8, pp. 1367–1378.

23. MacDougall J.D., Wenger H.A., Green H.J. Physiological Testing of the High Performance Athlete. Medicine & Science in Sports & Exercise, 1993, vol. 25, no. 2, pp. 305. DOI: 10.1249/00005768-199302000-00027
24. Maté-Muñoz JL, Lougedo JH, Barba M, Cañuelo-Márquez AM, Guodemar Pérez J, García-Fernández P, Lozano Estevan M del C, Alonso-Melero R, Sánchez-Calabuig MA, Ruíz-López M, de Jesús F, Garnacho-Castaño M V. Cardiometabolic and muscular fatigue responses to different crossfit workouts. J Sport Sci Med. 2018;17(4):668–79.
25. Maté-Muñoz JL, Lougedo JH, Barba M, García-Fernández P, Garnacho-Castaño M V., Domínguez R. Muscular fatigue in response to different modalities of CrossFit sessions. PLoS One. 2017; 12(7):1–17.
26. O'Leary DS. Heart rate control during exercise by baroreceptors and skeletal muscle afferents. Med Sci Sports Exerc . 1996 Feb [cited 2024 Junary 15];28(2):210–7.
27. Odynets, T., Todorova, V., Drazina, E., Bashavets, N., Vaniuk, O., Mamatova, Z. Improving the functional preparedness of Gre co-Roman wrestlers at the stage of preliminary basic training. Mov Cult J Martial Arts Anthrop, 2024, 24 (2): 68–74
28. Paine, M. J., Uptgraft, M. J., & Wylie, M. R. (2010). CrossFit study. Command and General Staff College, 1-34.
29. Partridge JA, Knapp BA, Massengale BD (2014). An investigation of motivational variables in cross fit facilities. J Strength Cond Res 28: 1714-1721.
30. Smith MM, Sommer AJ, Starkoff BE, Devor ST (2013) Cross fit-based high-intensity power training improves maximal aerobic fitness and body composition. J Strength Cond Res 27: 3159-3172.
31. Smith, Michael M, Allan J Sommer, Brooke E Starkoff, and Steven T Devor. 2013. "Crossfit-Based High Intensity Power Training Improves Maximal Aerobic Fitness and Body Composition." Journal of Strength and Conditioning Research / National Strength & Conditioning Association 27 (11): 3159 72.
32. Tibana RA, de Sousa NMF, Prestes J, Voltarelli FA. Lactate, heart rate and rating of perceived exertion responses to shorter and longer duration crossfit training sessions. J Funct Morphol Kinesiol. 2018;3(4).
33. Timón R, Olcina G, Camacho Cardeñosa M, Camacho-Cardenosa A, Martinez-Guardado I, Marcos-Serrano M. 48-hour recovery of biochemical parameters and physical performance after two modalities of CrossFit workouts. Biol Sport. 2019;36(3):283–9.
34. Utter A.C., O'Bryant H.S., Haff G.G., Trone G.A. Physiological Profile of an Elite Freestyle Wrestler Preparing for Competition: a Case Study. The Journal of Strength & Condi tioning Research, 2002, vol. 16, no. 2, pp. 308–315.