

# Comparison of the Effect of Resistance Training and Conditioning Programme Pattern on Physical, Physiological Factors and Performance of Young Wrestlers

Neha

(BPT student, Jagannath University, Haryana, India)

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## **Abstract:**

**Background:** Wrestling is mainly an anaerobic sport which involves periods of high intensity activity. The main objective of every wrestler is to physically dominate the opponent and to establish clear physical control on him/her. Wrestling competes in challenging environment involving repetitive bouts of high-intensity actions for example- attacks and counterattacks, alternated by sub-maximal work of low-intensity activity. This article will serve us to know about how different training protocols affects the physiology of a wrestler and which is the best training regimen to improve their performance.

**Materials and Methods:** In this study 30 wrestlers between the ages of 15 and 25 were recruited for the study. Divided into 3 groups of 10 each. The group 1 was followed resistance training protocol, group 2 conditioning and group 3 followed the traditional training program. Following the pre-test, a 4-week training protocol is created and administered after 15 days. After that, the post test is completed.

**Results:** The results show that there is significant effect of conditioning program in 2 weeks of protocol and helps in increasing endurance while the resistance training protocol shows increase in flexibility, strength and muscular circumference in all 4 weeks.

**Conclusion:** It is concluded that the resistance training plays significant role in increasing the power and strength in wrestlers. Conditioning programs is effective for 2 weeks and helps in increasing the endurance. And the resistance training should/can be followed by conditioning programme 1 week prior to the competition. And it can be the best protocol for the wrestlers for their performance.

**Key Word:** Wrestling, conditioning program, resistance training

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## **I. Introduction**

Wrestling is one of the oldest sports in the world, with its root embedded in first Olympic games in 776 B.C(Grindstaff & potach, 2006). Wrestling is mainly an anaerobic sport which involves periods of high intensity activity (Johnson Mark, Yesalis Charles, 1986). Wrestling is divided into two main styles, Greco-Roman and Freestyle. Currently the Greco-Roman is acknowledged as the classic style and freestyle is the internationally recognized for of competitive wrestling. The major difference between the two is that use of legs is permitted in freestyles wrestling both as target and as a mean of attack, whereas in Greco-Roman wrestling the participant is restricted to the body above the waist (Murlasits Zsolt, 2004). It is strength sport which requires large amount of muscle stamina, superior flexibility, control and intensive training. The main objective of every wrestler is to physically dominate the opponent and to establish clear physical control on him/her. Wrestling competes in challenging environment involving repetitive bouts of high-intensity actions for example- attacks and counterattacks, alternated by sub-maximal work of low-intensity activity. Wrestler's demands are complex, requiring athlete to have highly developed capacities of maximal strength, power, muscular-endurance, maximal aerobic power and anaerobic capabilities. The short quick bursts of maximal power activities during the match are maintained by the aerobic system, whereas the aerobic system manages the wrestler's ability to maintain effort throughout the duration of the match and accelerates the recovery process within and between successive matches. Modern wrestling needs both anaerobic and aerobic energy system with a different level of interventions (Chaabene et al., 2016). It is one of the sports branches where the muscle strength and power is most needed. Implementation of different proportions of action, such as pull, push and lift, during wrestling activities causing different physiological requirements. Wrestling specific movements show differences in the production of strength and in the produced strength, depending on which muscle group is used. For example, in standing wrestling, the load on the support leg may be higher than other leg during pushing movement, or in crotch lift movement, the duration of tension under an arm may be higher than for the other arm (Tatlici Ali et

al., 2021). Wrestling is a severe and heavy activity sport due to some physical and physiological needs such as anaerobic (power, strength, speed, lactate tolerance and stamina). It is a power-speed sport and wrestling competitions are carried out at different weights; more successful wrestler is one who has the endurance to carry out repetitive techniques and have tolerance to fatigue. Based on the results of the studies, the greatest increase in muscular strength and mass is achieved by use of maximum units (Mohammadi Mohammad et al., 2017). Training is mainly an art and like the artist a successful training programme must have two components. First is that creative training, which indicates success in any sport on its ability to respond quickly of flexibility, strength, speed and reliability to player demands and better opportunities. Second is technical mastery of skills used (Shaker, 2007). Therefore, a systemic and appropriate training programme is a great asset for players. Wrestling is a sport that incorporates functional strength with the elements of isometric training for lactic acid tolerance and aerobic endurance. Training program for wrestlers includes the exercises which aim to improving their aerobic and anaerobic capacity both with endurance running and wrestling with an opponent (Mandroukas et al., 2010). Wrestlers wants to gain lean body mass, increase their strength and power at their current weight, to enhance their muscular endurance, for each category a different training regimen is required. Due to physical nature of sport of wrestling, the body becomes very vulnerable to injury. Athletetraining goals should reflect the level of his technical skill, strength, power, muscular endurance, and physical maturity (Mark Johnson et al., 1986). A match lasts about 6 to 8 minutes and can elevate blood lactate concentrations in excess 15mmol/L and sometimes reach nearly 20mmol/L. Lactate directly affects muscle contractile mechanism by interfering with actin myosin cross bridge interaction. The main emphasis in wrestling is the ability to sustain short, explosive bursts of energy for the duration of the match to execute offensive attacks and defensive counters. Wrestling places very high demands on two of the three main energy systems which are ATP-CP and lactic acid anaerobic systems (Ozbay Serhat, Ulupinar Süleyman, 2018). Resistance training is a term that implies the use of load, machinery, or own body weight while exercising the muscles. It is mainly used to increase the ability to overcome load and increase muscle mass. High levels of muscular strength are needed to implement high-level techniques and skills. Generally, it has been seen the multiple exercises to increase muscle strength and muscle hypertrophy, due to greater volume of resistance and conditioning, are better than one time practice method. On the other hand, the use of improper pattern with a gradual increase of load from one turn to the next, using the number of repetitions in lower load times increase the stress time for group of muscles. The strength training programmes, and conditioning will improve the strength of each unit of the cross-sectional area of the muscles (Mohammadi Mohammad et al., 2017). Strength is a component of all wrestling techniques. It is the ability of group of muscles to overcome given resistance. Strength training provides wide range of functional benefits and improvement in overall health and well-being, including increased bone density, increased metabolism, improved cardiac output, improved joint function, reduce risks of injuries (Grisaffi J. David,1996). To maximize strength component, wrestler must implement several key ingredients in training program like agility, speed, endurance, and flexibility, anaerobic and aerobic conditioning, quickness. Strength training improves both physical and mental development, in turn improving confidence and athletic ability. Cardiovascular conditioning is also important for the resynthesizing ATP production and is also vital to the recovery (Grisaffi J. David,1996). Some research estimated that 90 percent of energy needs for wrestling derived from anaerobic sources and equal to the combination of alactic and lactic energy system. Conditioning helps in identifying the strengths and weakness in area of training, improves fitness. Conditioning exercises requires whole body movement and repeatedly requires muscular activation and input from different muscle groups. The simple repetitive movement with sandbags can be used as conditioning workout. Material used during the training is relatively inexpensive and allows teams with small budgets to purchase multiple sandbags (Wright et al.,2015). The scientifically determined training principles are helpful in achieving the superior conditioning training program. At present running is the most supplemental conditioning exercise followed by wrestlers, providing strength development of musculature. Rowing ergometers provides cardiovascular benefits as running. A successful wrestler has developed cardiovascular system, high tolerance to lactic acid, a high degree of strength, power and muscular endurance and the ability to perform large amount of work (Cipriano Nick,1988). In the training program the conditioning programme is included with a circuit format with rest period between the sets and exercises and ending with a total body exercise. The principle of "prioritization" will be used during designing the protocol. Total work performed can be increased by adding the extra set of training in sequential manner. The main aim of the conditioning program is to develop toleration of the high hydrogen ion and lactic acid concentrations, which increases the acid – buffering mechanism in body (Cipriano Nick,1988). Most effective conditioning method for wrestling is to devote significant part of practice time to "hard" wrestling. Secondary is drills, running sprints stairs running, key to success is intensity. Intensity in this case is training at or beyond the threshold which is approximately 80-50 percent plus of maximal heart rate (Johnson Mark et al., 1986). The duration of the muscle action and the number of training-muscle actions per day individually show weaker correlations to increases in strength than do muscle muscle-action duration and the number of muscle actions combined, which indicates that the length of time a muscle is activated is directly related to increased

strength (Kraemer J. William et al.,2004). Wrestling dummy is an excellent apparatus for conditioning training, the conditioning exercises are very specific to actual wrestling and subsequently offer the greatest specificity of training. With dummy technical-tactical component of wrestling will be enhanced (Cipriano Nick,1988). The unique nature of grappling sports includes the need to score points with direct resistance from a live moving body. Athletes are forced to move in an explosive manner and without regard for an opponent. Sport specific resistance training is vital to success in grappling sports like wrestling. Without a doubt, the use of resistance and overload principles and proper conditioning helps athletes improve (Kozub M. Francis, Voorhis Thomas, 2012). There are several misconceptions about the resistance training and wrestling. The first is that if you lift weights and gain strength you will also gain weight in the process. A wrestler following a proper diet (basically high carbohydrate, moderate protein, and low fat) and using a three times per week resistance routine can experience significant gain in strength and power over a period without a correspondingly significant increase in weight. A second misconception is that wrestling practice and competition alone will maintain strength and power. This, too, is incorrect based upon research, in wrestling without maintenance lifting will often result in the loss of muscle mass. As with conditioning, intensity is the most important component of training. In this instance intensity is defined as “lifting at or past the point of fatigue” (Jonson, 1986). The knee, ankle, shoulders, back and neck are typical sites of injury in wrestling. Injured wrestlers should be encouraged to lift when it is appropriate. This has many benefits, first, weight training can assist in rehabilitation of injury or can help in minimizing the atrophy of both the injured and healthy limb. Secondly, strength and conditioning for injured athlete allows some form of participation with the team rather than sitting idly by and watching. This participation in turn will foster a more positive mental attitude during a time when many athletes feel dejected due to their injury (Johnson, 1986). The most important factor in designing an exercise protocol is to focus on the variables of the program, such as practice type, the number of sets, the choice of resistance, the number of repetitions, or the rest between the training sessions. Given the importance of maximum power, the endurance of anaerobic power and power in the good performance of wrestlers and the lack of consistency of studies conducted to determine the best method to increase strength and muscle mass. Therefore, the purpose of this study is to compare the effect of selected resistance training pattern and simple conditioning programme on some physical and physiological factors of young wrestlers.

## **II. Material And Methods**

This prospective comparative study was carried out on players at Jaibir Aakhara, Khel Samiti, Bupania, Haryana from December 2021- January 2022. A total 30 adult male wrestlers of aged 15 to 25, years were for in this study.

**Study Design:** Prospective open label observational study

**Study Location:** This was a wrestling academy setting teaching different techniques. Jaibir Aakhara, Khel Samiti, Bupania, Haryana, India.

**Study Duration:**December 2021- January 2022

**Sample size:** 30 wrestlers

### **Inclusion criteria:**

1. Wrestlers
2. Age group 15-25 years
3. Gender- males
4. Weight category – 40 to 100kg
5. No previous history of major trauma/injury
6. No previous history of major surgery

### **Exclusion criteria:**

1. Age below 15 years
2. Age above 25 years
3. Player with major injuries and surgeries
4. Wrestler with any deformity.
5. Wrestler with any systemic illness.
6. Wrestlers taking concurrent corticosteroids, hormone replacement therapy.
7. Wrestlers who are physically inactive.

### **Variables**

**Independent Variable:** Age

**Dependent Variable:** Weight and training protocol.

**Procedure methodology**

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited wrestlers retrospectively. The questionnaire included socio-demographic characteristics such as age, gender, nationality, height, weight, and consanguineous marriage, physical activity and lifestyle habits like smoking and alcohol and address.

Players was informed about the study and pre-tests are performed for assessment of flexibility, strength and endurance, then divided into three groups:

- Group1 – resistance training
  - Group2- conditioning program
  - Group3 – traditional wrestling training program
- ( each group contains 10 players.)

After 15 days of protocol post tests performed for the intermediate readings of the study for flexibility, strength and endurance.

At last on last day of 4 week of protocols post 4 week assessment was taken and data were analysed accordingly.

**Statistical analysis**

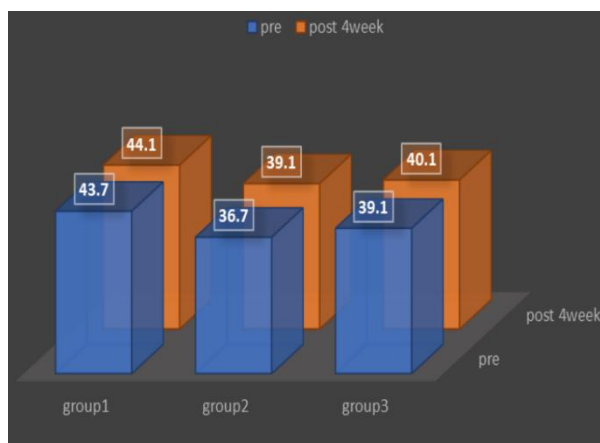
Data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL). ANOVA test was used to ascertain the significance of differences between mean values of two continuous variables. Chi-square and Fisher exact tests were performed to test for differences in proportions of categorical variables between two or more groups. The level  $P < 0.05$  was considered as the cutoff value or significance.

**III. Result**

**Follow up after 4 weeks:** for flexibility- Pre and post 4 weeks values of STVJT between the groups were analysed using repeated measure ANOVA. The analysis revealed there is no significant effect within the groups  $F(1,27)=.395$   $p>0.05$ . The mean difference of stvjt and p2stvjt for group 1 ( $43.7\pm10.22$ ) ( $44.1\pm8.02$ ), group 2 ( $36.7\pm7.67$ ) ( $39.1\pm5.48$ ) and group 3 ( $39.1\pm10.39$ ) ( $40.1\pm3.03$ ).When pre and post 4 weeks assessment of standard vertical jump test are compared in given 3 groups there is significant effect in group 2 but no significant effect in group 1 and group 3.

\*stvjt- pre standard vertical jump test

\*p2stvjt- post 4 weeks standard vertical jump test



**Table no 1: PRE AND POST 4 WEEKS FLEXIBILITY WITHIN THE SUBJECTS**

Source	Sum of Squares	df	F	Sig
TIME	13.067	1	.459	.504
TIME * GROUPS	22.533	2	.395	.677
Error(TIME)	769.400	27		

**For strength:**

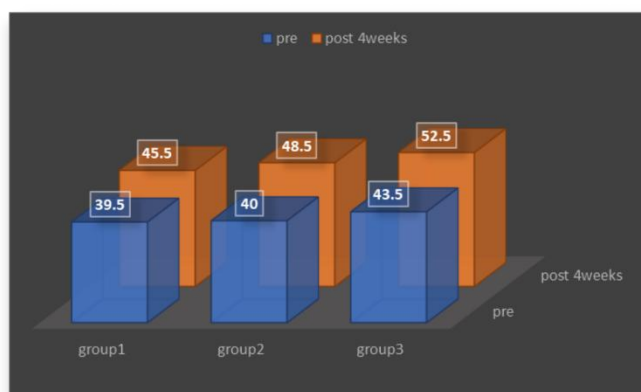
**Table no2 :**Pre and post 4week values of DMST between the groups were analysed using repeated measures ANOVA. The analysis revealed there is significant effect within the groups  $F(1,27) = 1.103$   $p < 0.05$ . the mean difference of DMST and P2DMST for group 1 ( $39.5 \pm 7.16$ ) ( $45.5 \pm 8.18$ ), group 2 ( $40 \pm 4.83$ ) ( $48.5 \pm 7.83$ ) and group 3 ( $43.5 \pm 12.03$ ) ( $52.5 \pm 13.21$ ). This shows that there is significant effect in all groups following resistance training, conditioning program and the traditional training program.

\*DMST- pre dynamic muscular strength test

\*P2DMST- post 4 weeks dynamic muscular strength test

**Table no 2 :PRE AND POST 4 WEEK STRENGTH WITH IN SUBJECTS**

Source	Sum of Squares	df	F	Sig
TIME	920.417	1	78.581	.000
TIME * GROUPS	25.833	2	1.103	.346
Error(TIME)	316.250	27		



**For endurance:**

Pre and post 4 weeks values of DMET between the groups were analysed using Repeated measures ANOVA. The analysis revealed there is significant effect within the groups in term of both weight and repetitions  $F(1,27) = 1.911$  and  $1.999$   $p < 0.05$ . The mean difference of weight and repetitions pre and post 4 weeks for group 1 ( $34.5 \pm 18.2$ ) ( $36 \pm 8.09$ ), ( $18.2 \pm 9.63$ ) ( $18.4 \pm 7.7$ ), group 2 ( $35 \pm 4.83$ ) ( $39 \pm 3.49$ ), ( $12.1 \pm 2.84$ ) ( $16.3 \pm 3.05$ ) and group 3 ( $38.5 \pm 12.03$ ) ( $43 \pm 10.48$ ), ( $13.7 \pm 4.8$ ) ( $12.4 \pm 2.91$ ). This shows that there is significant effect in group 2 and group 3 while there is no such effect in group 1 following resistance training.

\*erep- pre-endurance test repetitions

\*p2erep- post 4-week endurance test repetitions

\*ewt- pre-endurance test weight

\*p2ewt- post 4-week endurance test weight

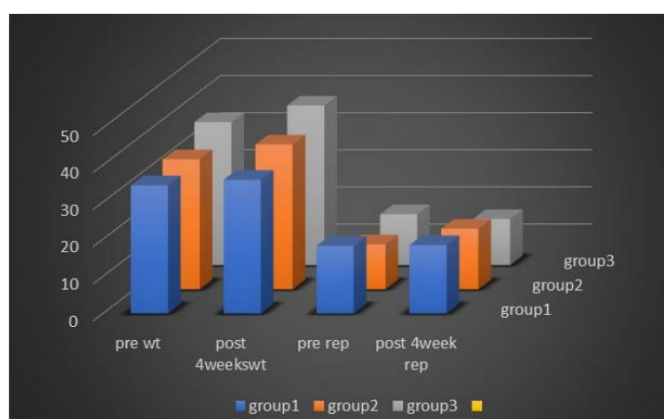
\*DMET- pre dynamic muscular strength test

\*P2DMET- post 4 weeks dynamic muscular strength test

**Table no3 : PRE AND POST 4 WEEK WEIGHT LIFTED**

Source	Sum of Squares	df	F	Sig
TIME	166.667	1	24.658	.000
TIME * GROUPS	25.833	2	1.911	.167
Error(TIME)	182.500	27		

Source	Sum of Squares	df	F	Sig
TIME	33.750	1	2.132	.156
TIME * GROUPS	63.300	2	1.999	.155
Error(TIME)	427.450	27		



#### IV. Discussion

The aim of the present study was to find out the best training programme for young adult wrestlers. In this study we created three training programmes which are resistance training, conditioning programme and the traditional training programme for wrestlers. We got overall data of 30 subjects i.e. 10 subjects in each training programme group and their data was analysed statistically. Wrestling is one of the oldest sports in world, it mainly involves high intensity anaerobic activities. The main objective of every wrestler is to dominate the opponent and establish physical control on him/her. Implementation of different proportions of action such as pull, push, and lifts during wrestling activities needs muscular strength and power.

To maximize strength and power component wrestlers must implement several key ingredients in training program like agility, speed, endurance, and flexibility. Our study programme focused on these parameters and helped to find out the best training pattern. In other words, as per the study which has been performed clearly shows that there is significant changes in the strength endurance and flexibility with the help of specific training programme.

Flexibility is one of the major key ingredients in training programme to maximize the power and strength in wrestlers. It was evaluated in participants with the help of standard vertical jump test. There is significant effect seen in flexibility after 15 days of traditional wrestling programme in group 3 while there is no such effect seen in group 1 and 2 with resistance training and conditioning programme. After 4 weeks of training flexibility increased in group 1 and group2 while the flexibility in group 3 participants was same as noted on day 15.

Strength in the participants was assessed by the dynamic muscular strength test, in which the participant must lift the maximum weight in one go. After 15 days of training group 1 shows no such significant increase in strength while group 2 and group 3 show tremendous increase. When we compared the post 15 days and post 4 week reading group 2 participants following conditioning programmes shows no such variations as

per the previous evaluation. While the group 1 and group 3 participants following resistance training protocol and traditional training programme showed increase in strength after 4 weeks.

Endurance is the major factor for maximizing the power, as it helps the player to survive in longer bouts. It is determined by the dynamic muscular endurance test, in which the subject is asked to lift the 30% of his maximum weight and had to do maximum repetition with that. After 15 days of training programmes group 2 and group 3 shows significant effect while the group 1 participants showed no such effect, even after 4 weeks of training group 1 participants showed no such effect in endurance, while the group 2 and group 3 participants who followed the conditioning programme and traditional wrestling training programme showed increase in endurance after both post 15 days and post 4-week assessment.

Resistance training protocol showed significant increase in muscular circumference both thigh and the arm while the conditioning programme and traditional training programme showed no such effect. So, this study shows that the resistance training programme is much more significant and helpful for the wrestlers to improve their strength and power as compared to the conditioning program and the traditional training programme. While the conditioning programme helps in increasing the endurance in players. Traditional method is helpful in learning techniques and moves but it showed no such significant in increasing the power and strength of the participants.

#### **LIMITATIONS OF STUDY:**

1. Availability of the equipment plays significant role in each training programme.
2. Due to absence of some of the equipment restricted the training protocols to some extent.
3. No. Of participants.

#### **FUTURE RECOMMENDATIONS:**

Further study should be done on detailed effect of resistance training in wrestling.

Role of training equipment in wrestling, whether they limit the training programme or not.

How can we improve the old traditional training program so that it serves the players in significant way.

### **V. Conclusion**

From this study, it is concluded that the resistance training plays significant role in increasing the power and strength in wrestlers. Conditioning programmes is effective for 2 weeks and helps in increasing the endurance. And the resistance training should/can be followed by conditioning programme 1 week prior to the competition. And it can be the best protocol for the wrestlers for their performance.

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