

# The Effect of Sand dune Running and Stair Climbing Training on Vertical Jump Performance in Handball Players

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## ABSTRACT

The purpose of the present study was to investigate the effect of sand dune running and stair climbing training on Vertical Jump performance in handball players. 45 male handball players who aged 15-21 voluntarily participated in the study. They were randomly assigned in sand dune running (n=15) and stair climbing training (n=15) groups and third group were served as (n=15) control group. Both groups performed selected sand dune running and stair climbing training for 10 weeks. Data was analyzed using ANOVA and Scheffe's Confidence Interval Test Scores methods. The results showed that levels of jumping performance were significantly improved in post-test compared to pre-test. Between-groups comparison showed better records in jumping performance for stair climbing compared with sand dune training group after eight weeks. According to the results, it can be concluded that both sand dune running and stair climbing training exercises increase jumping performance in handball players. Therefore, these types

of training methods are suggested to handball players and coaches for improving vertical jump performance which required in handball game.

**Keywords:** Sand dune running, stair climbing, vertical jump, Handball players

## INTRODUCTION

Professional handball players perform a large number of explosive bursts such as shooting, jumping, dribbling, sprinting and pace changing during a handball match vertical jump is play most important role during handball game. Some jumping training exercises help improve vertical jump. Training exercises which include stopping, starting, and direction changing and have explosive nature can help athletes to improve jumping ability. Stair climbing exercises improve jumping ability in handball players. Explosive power is also an important factor in leg muscles of handball players. It is very important to obtain a level of explosive power in handball. Explosive power is one of the

essential factors for skillful athletes, which enables them to achieve their peak jump height. However many explosive movements require little time. Therefore, obtaining maximum muscle strength from the major muscle groups of the lower limb for explosive power needs particular jumping exercises for jumping performance. The stair climbing is also a type plyometric exercises.

Russian athletes first used stair climbing exercises in 1960 summer Olympics as a type of explosive training. Stair climbing training is a type of neuromuscular training leading to increased explosive power to use maximum power in minimum time. This training causes some changes in neuromuscular system and improves muscle's strength to response rapidly and strongly during competitions

Sand dune training has also become an essential method to improve athletes' speed, endurance and explosive power. Research results show that sand dune running training improves explosive power, vertical jump and speed in professional handball players by affecting the leg extensor muscles

Speed and explosive power are qualifying components for physical fitness and desirable athletic performance, and play a key role in most

sports, especially handball. Sand dune running and stair climbing training can be a prerequisite for coaches and athletes success. Therefore, this study investigated the effect of sand dune running and stair climbing training on explosive power or vertical jump ability of handball players.

## MATERIALS AND METHODS

The subjects of this study were 45 male handball players who aged 15-20years old. The subjects were randomly divided into sand dune running (n=15) and stair climbing (n=15) groups and (n=15) control group. To perform the study, the research topic, purpose, as well as the method of execution was explained to the subjects. Then the subjects voluntarily consented to participate in the study and signed a medical health questionnaire. The criteria for participating in the study included general health, lack of a specific diet and medication, age, and sport field. In addition, the questionnaires determined that any of the subjects had not participated in regular sand dune running and stair climbing exercises before and they were forbidden to participate in such exercises except in the specific training program.

The correct way to perform the exercises was explained to the subjects at the preparatory meeting before the main test. Vertical jump tests near the wall were used to measure explosive power of the subjects of both groups. In addition to regular handball training for eight weeks, subjects in both groups performed their groups' specified exercises three times a week for 60 minutes per session. After eight weeks, the tests were performed again to collect the data.

#### Stair climbing training Program

The subject warmed up for 15 minutes consisting of jogging and stretching. Then stair climbing exercises were performed for 40 minutes and they performed soft jogging and stretching to cool down and recover for 15 minutes.

#### Sand dune running Training Program

Sand dune running training exercises were performed three days a week during the eight-week period. The sand dune running training program started with warm up, and continued long ten kilometer running in sand dune near the village Lalgargh to 10 Chak and finally the subjects cooled down.

#### Statistical Methods

Statistical analysis was performed using SPSS version 18. The differences between the initial and final scores in vertical jump was subjected to statistical treatment using Analysis of variance (ANOVA) to find out whether the mean differences was significant or not. The Scheffe's post hoc test was used to find out the paired means significant differences.

### RESULT AND DISCUSSION

Results on jumping ability, of initial and final means of muscular strength due to effect of sand dune running and stair climbing exercise are presented in Table 1.

Table 1. Computation of Analysis of Variance of Vertical Jump

	Yogic practices	Aerobic exercises	Control group	Source of variance	Sum of squares	Df	Mean squares	Obtained f
Pre test Mean	21.35	21.39	21.25	B W	0.16 23.84	2.42	0.08 0.56	0.143
Post test Mean	24.79	26.07	21.22	B W	189.92 27.81	2.42	94.96 0.66	143.416*
Adjusted post test Mean	24.78	26.02	21.28	B W	180.03 12.87	2.41	90.01 0.31	286.757*
Mean difference	3.44	4.68	0.03					

F-ratio significant Table at 0.05 level of confidence for 2 and 42(df) is=2.39. The obtained F value on muscular strength of post-test means 143.416 was greater than the required F value 2.39, which proved that the interventional programmes, sand dune running and stair climbing exercise were significantly improved muscular strength of handball players.

Taking into consideration of the pre-test means and post-test means adjusted post-

test means were determined and analysis of variance was done and the obtained F value 286.757 was greater than the required value of 2.39 and hence it was accepted that the sand dune running and stair climbing exercise significantly increased muscular strength of the handball players. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The result is presented in Table 2.

Table -2 Scheffe's Confidence Interval Test Scores on Muscular Strength (Scores in Centimeters)

Yogic practice	Aerobic exercise	Control Mean	difference	Required C
24.78	26.02		-1.33*	0.52
24.78		21.28	3.63*	0.52
	26.02	21.28	4.93*	0.52

Table 2 further shows the post hoc analysis of obtained ordered adjusted means of the sand dune running , stair climbing exercise and control groups. From the results presented in Tables I and II it is proved that the interventional programme sand dune running and stair climbing exercise significantly increased jumping performance of school handball players. Analysis of adjusted means through Scheffe's post hoc test further proved that there is significant differences existed between sand dune running and stair climbing exercise s

group, sand dune running group and control group, stair climbing training group and control group. This proved that due to the influence of six weeks of training on sand dune running and stair climbing exercise the school basketball players significantly improved their jumping performance comparing to control group.

## CONCLUSION

1. It was also concluded that stair climbing training group is significantly better than the control group in

improving the jumping performance among school handball players.

2. It is concluded that sand dune running training group was significantly better than the control group in improving the jumping performance among school handball players.

3. It is further concluded that stair climbing training group was significantly better than sand dune running group in improving the muscular strength as measured through standing wall vertical jump test.

According to the results, it can be concluded that stair climbing and sand dune running -training exercises were effective in increasing explosive power and vertical jumping in handball players. Stair climbing training had more favorable effects on the study vertical jumping performance compared with sand dune running exercises. So these training methods are recommended to handball players and coaches for improving speedy and skilled performances.

## References

Akdur, H., Sozen, A. B., Yigit, Z., Balota, N., & Guven, O. (2007). The effect of walking and step aerobic exercise on physical fitness parameters in obese women. *Istanbul Tip Fakultesi Dergisi Cilt*, 70(3), 64 – 69.

American College of Sports Medicine-ACSM (1998). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Medicine and Science in Sports and Exercise*, 30, 975-991.

Astrand, P. O. (1999). Why exercise?. *Kineziology*, 31(2), 17-22.

Bassulk, S. (2003). Physical activity and cardiovascular disease prevention in women: How much is good enough? *Exercise & Sport Science Reviews*, 31(4), 176-181.

Blair, S.,N., LaMonte, M.J., & Nichaman, M.,Z. (2004). The evolution of physical activity recommendations: How much is enough? *American Journal of Clinical Nutrition*, 79(5), 913-920.

Blattner, S. & Noble, I.(1979), “Relative effects of isokinetic and plyometric training on vertical jumping performance” *Research Quarterly*, 50 (4), 583-588.

Brick, L. (1996). *Fitness aerobics - Fitness spectrum series*. Human kinetics. USA.

Caspersen, C., J., Powel, K., E., & Christenson, G., M. (1985). Physical activity exercise, and physical fitness: Definitions and distinctions for health -related research. *Public Health Reports*, 100(2), 126-131.

- Chu, D. A. (1991), *Jumping into plyometrics*. Champaign, IL: Leisure Press.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*, 2nd Edition. Hillsdale: Lawrence Erlbaum.
- Dursenev, L. I. & Raevsky, L.G. (1979), "Strength training of jumpers". *Soviet Sports Review*, 14 (2), 53-55.
- Gehri, D. J., Ricard, M.D., Kleiner, D.M. & Kirkendall, D.T. (1998), "A comparison of plyometric training techniques for improving vertical jump ability and energy production" *Journal of Strength and Conditioning Research*, 12 (2), 85-89.
- Impellizzeri, F. M., Rampinini, E., Castagna, C., Martino, F., Fiorini, S. & Wisloff, U. (2008), "Effect of plyometric training on sand versus grass on muscle soreness and jumping and sprinting ability in soccer players". *British Journal Sports Medicine* 42(1), 42-46.
- Kumar, R. & Kumar, H. (2005), "Effect of six-weeks of plyometric circuit training on the jumping performance of female college players" *Journal of Exercise Science and Physiotherapy*, 1 (1 - 2), 46-59.
- Komi, P.V. & Bosco, C. (1978), "Utilization of stored elastic energy in leg extensor muscles by men and women" *Journal of Sports Science and Medicine*, 10(4) 261-265.
- Markovic, G. (2007), "Does plyometric training improve vertical jump height? A meta – analytical review" *British Journal of Sport Medicine*. 41 (6), 349-355.
- Stojanovic, T. & Kostic, R. (2002), "The effect of plyometric sport training model on the development of the vertical jump of volleyball players". *Facta Universitatis Series: Physical Education and Sport*, 1(9), 11 – 25.
- Tillman, M.D., Hass, C.J., Brunt, D. & Bennett, G.R. (2004), "Jumping and landing techniques in elite women's volleyball" *Journal of Sports Science and Medicine*, 3(1), 30-36.