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HIGH ALTITUDE VOLLEYBALL PLAYERS THE IMPACT OF RESISTANCE AND AEROBIC TRAINING WITH PROTEIN INTAKE ON BMI

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Abstract

This study aimed to investigate the impact of resistance and aerobic training with protein intake on the body mass index (BMI) of volleyball players living at altitude. The participants consisted of 48 male volleyball players, randomly divided into four groups: the resistance training with protein intake group 1 aerobic training with protein intake group II combined resistance and aerobic training with protein intake group III and control group IV the EGunderwent a 12 –week training programme that consisted of resistance and aerobic exercises, coupled with high protein intake . The CG received no intervention during the study period. The BMI of both groups was measured at the beginning and end of the study. The results showed that the EG had a significant decrease in BMI compaired to the CG ($p<0.05$). The study concludes that resistance and aerobic training with protein intake can effectively reduce BMI in high- altitude volleyball players

Keywords: *Resistance and aerobic training, Protein intake BMi, Alititude volleyball players*

INTRODUCTION

High-altitude training has been shown to improve physical performance in athletes due to the hypoxic environment that leads to adaptations in the respiratory, cardiovascular and muscular systems. Volleyball is a sport that requires high levels of strength, endurance , and agility . However, living at high altitude can pose challenges to athletes, such as decreased oxygen availability, which can lead to decreased muscle mass and increased body fat. Resistance and aerobic training, coupled with high protein intake, have been shown to be effective, in promoting muscle growth and reducing body fat . previous studies have demonstrated the benefits of resistance and aerobic training with protein intake in athletes at sea level. However, the impact of these interventions on the body mass index (BMI) of volleyball players living at high altitude remains unclear.

Therefore, the present study aimed to investigate the impact of resistance and aerobic training with protein intake on the BMIof volleyball players living at altitude. Understanding the effects of these interventions on BMI in high –altitude athletes can aid in the development of more effective training programsthat can optimize their physical performance

METHODOLOGY

Subjects and Variable

This study was confirmed to forty eight (N=48) male inter-collegiate level volleyball players studying in various Colleges, in Kashmir region, India as subjects and their age ranged from 18 to 24 years.. The number of groups for the study was delimited to four and designed as resistance training with protein intake (group-I), aerobic training with protein intake (group-II) and combined resistance and aerobic training with protein intake (group-III) groups and control group (group-IV). The number of subjects in each group was confined to twelve. All 3 groups were assessed before and immediately after 12 weeks of training period on Body mass index of volleyball players Weighing Machine& Stadiometer

BMI = Weight / $(\text{Height})^2$ Kg/m^2

Training Programme

The experimental group-I performed resistance training with protein intake, group-II performed aerobic training with protein intake, group-III performed combined resistance and aerobic training with protein intake. The experimental groups performed these training three alternative sessions per week for 12weeks. Resistance training involves the following exercises namely military press, bench press, squat, lat pull down, standing calf raise, leg curl respectively. The resistance training program was a total body workout consisting of 3 sets of 6-10 repetitions on 6 exercises that trained all the major muscle groups. A percentage of each subject's onerepetition maximum for each exercise was used to determine the intensity of each week. The intensity (70- 95% of 1RM) and number of repetitions performed for each exercise was progressively increased. The intensity was increased as training progressed.

The experimental group-II performed aerobic training alternatively three days in a week for twelve weeks. In this present investigation continuous running was given to the athletes as aerobic training. To fix the training load for the aerobic group the subjects were examined for their exercise heart rate in response to different work bouts, by performing continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio. The subject's training zone was computed using Karvonen formula and it was fixed at 70%HRmax to 95%HRmax. The rest - work ratio of 1:1 in-between exercises and 1:3 between sets was given.

The subjects of experimental group-III performed combined resistance and aerobic training alternatively three days in a week for twelve weeks. The resistance training program was a total body workout consisting of six exercises that trained all the major muscle groups. The resistance training load was fixed based on one repetition maximum (1RM) of each participant. The aerobic training consists of continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio.

Protein Supplementation

The subjects of experimental group-I, II and III was recommended to take protein as designed for them by expert dieticians during the 12-week treatment period. The review of literature shows that 0.8 to 1.5 g/kg protein supplementation is adequate in the players (elite). Based on this 1.2 g/kg protein drinks (solution) was supplemented for subjects half an hour before dinner approximately 7.00 pm for three days during training period. Similarly placebo was given to non supplementation group i.e. (control). The placebo contains sugar (Glucose) solution; which does not have any effect.

Statistical Procedures

The collected data was statistically analyzed by paired ‘t’ test. Further, percentage of changes was calculated to find out the alterations in Maximum oxygen consumption due to the impact of experimental treatment. Further, the data collected from the four groups prior to and post experimentation on Maximum oxygen consumption was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained ‘F’ ratio value was found to be significant for adjusted post test means, the Scheffe’s test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 level for significance.

Table 1 to 3 Descriptive Statistics and Dependent ‘t’ Test Results on Body Mass Index Data (Pre & Post) of the Chosen Four Group’s Volleyball Players Living at Altitude

Group’s Name	Testing Periods		Mean Values	SD Values	MD	Changes in %	‘t’ – ratio
Resistance Training with Protein Intake	Pre	2	27.05	1.68	1.43	5.29	6.68*
	Post		25.62	1.59			
Aerobic Training with Protein Intake	Pre	2	27.58	1.38	3.67	13.34	11.60*
	Post		23.91	1.31			
Combined Training with Protein Intake	Pre	2	27.31	1.58	2.09	7.65	3.23*
	Post		25.22	1.31			
Control	Pre	2	27.03	1.26	0.25	0.70	0.69
	Post		27.28	1.96			

*Table value for df11 is 2.20(*significant)*

The body mass index data (pre & post) of the chosen three treatment group’s volleyball players living at altitude vary clearly because the dependent ‘t’ test values of resistance training with protein intake (6.68), aerobic training with protein intake (11.60) as well as combined training with protein intake (3.23) groups are more than 2.20 (table value needed for 11 df).

Intake of protein during resistance training lead to 5.29% of changes, intake of protein during aerobic training lead to 13.34% of changes whereas intake of protein during combined training (resistance & aerobic) lead to 7.65% of changes in body mass index of the volleyball players living at altitude.

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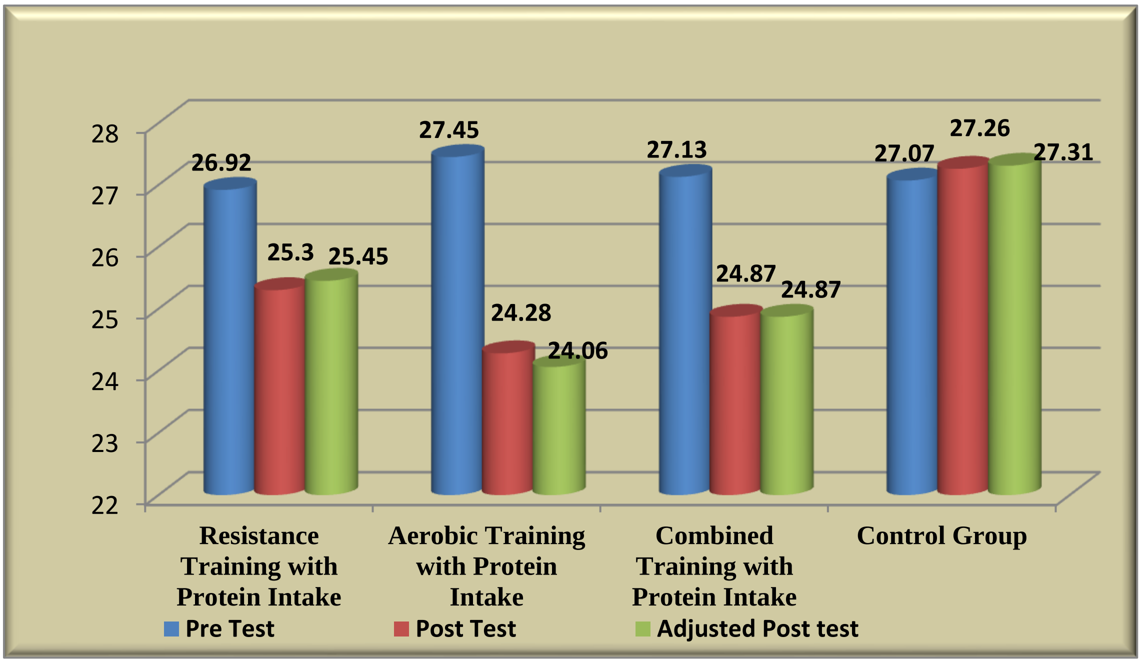
The body mass index data (pre, post &adjusted) of the chosen four group's volleyball players living at altitude are graphically represented in Figure-III.

Figure – I
Figure Showing the Body Mass Index Data of the Chosen Four Group's Volleyball Players Living at Altitude



The body mass index data (pre&post) of the chosen four group's volleyball players living at altitude are analyzed by ANCOVA statistics and the derived results are displayed in Table - 4.8.

Table – 2

ANCOVA Results on Body Mass Index of the Chosen Four Group's Volleyball Players Living at Altitude

Mean	**Resistance Training with Protein Intake**	**Aerobic Training with Protein Intake**	**Combined Training with Protein Intake**	**Control Group**	**SoV**	**SS**	**df**	**MS**	**'F' ratio**
Adjusted-Post-test	25.73	23.71	25.18	27.41		82.23		27.41	15.55*

*(Table value for df 3& 35 are 2.87)*Significant (.05 level)*

The results derived through the application of ANCOVA statistics proved that the adjusted (post test) means on body mass index of resistance training with protein intake (M=25.73) aerobic training with protein intake (M=23.71) combined training with protein intake (M=25.18) and control (M=27.41) groups volleyball players living at altitude resulted in 'F' value of 15.55 which is better to 2.82 (*Table value needed fordf 3 &43* =2.87).

As the adjusted(post-test) means of chosen four group's of volleyball players living at altitude differ from each other, the **Scheffe's**statistics was applied (Table-4.9).

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Table – 3
Post Hoc (Scheffe's) TestResults on Body Mass Index of the Chosen Four Group's Volleyball Players Living at Altitude

Resistance Training with Protein Intake	Aerobic Training with Protein Intake	Combined Training with Protein Intake	Control	MD	CI
25.73	23.71			2.02*	1.58
25.73		25.18		0.55	1.58
25.73			27.41	1.68*	1.58
	23.71	25.18		1.47	1.58
	23.71		27.41	3.70*	1.58
		25.18	27.41	2.23*	1.58

**Significant (.05)*

It(Scheffe's test result)exhibited that due to resistance training with protein intake (MD=1.68), aerobic training with protein intake (MD=3.70) and combined training with protein intake (MD=2.23) the body mass index of the volleyball players living at altitudewas decreasedconsiderably. However, aerobic training with protein intake group was much better than resistancetraining with protein intake (2.02>1.58)group. When comparing combined training with protein intake group by aerobic training with protein intake (1.47<1.58) as well as resistance training with protein intake(0.55<1.58) groups insignificant difference was found between them.

DISCUSSION

In addition to the optimal amount of protein intake in athletes, how an athlete should distribute the consumed protein across the day remains unclear. Studies have found that in athletics, higher frequencies of protein intake are more beneficial for an ideal body composition than consuming larger amounts less often **(Phillips *et al.*, 2007)**. In a regularly trained athlete, protein is consistently being utilized to heal damaged muscle and increase muscle cell size. While frequent exercise increases lean body mass, it is the proper intake of protein that is directly related to the increase in muscle protein synthesis (MPS) **(Layman *et al.*, 2005)**. A higher lean body mass to fat mass ratio is an ideal quality of an athlete. **Lidor, Ronnie & Gal Ziv,(2010)** found that more successful volleyball players (VPs) averaged three kilograms (kg) less fat mass than those VPs who are less successful. A higher fat free mass (FFM) to fat mass ratio can contribute to both anaerobic power and aerobic capacity. Volleyball is a largely anaerobic sport and typically that anaerobic power is positively associated with high lean body mass **(Buśko*et al.*, 2013; Anderson, 2010)**. Building lean body mass (LBM) is not only brought on by exercise, but is also influenced by a proper diet **(Pilaczyńska-Szcześniak*et al.*, 2011)**. Those who exercise three to five times per week at 30 minutes a session are typically satisfied with 1,800 to 2,400 kcals per day on average. Elite athletes, on the other hand, may need anywhere from 6,000 to 12,000 kcals per day. In the context of protein, findings show that intensely trained athletes are allowed up to two times the RDI of protein, which is equivalent to five servings of lean meat per day **(Teta*et al.*, 2013)**. Changes in body composition and weight loss frequently occur when humans are exposed to hypoxic environments. The mechanisms thought to be responsible for these changes are increased energy expenditure resulting from increased basal metabolic rate and/or high levels of physical activity, inadequate energy intake, fluid loss as well as gastrointestinal malabsorption. The severity of hypoxia, the duration of exposure as well as the level of physical activity also seem to play crucial roles in the final outcome. Hypoxic conditioning is presumed to have an important beneficial potential in weight management and body composition enhancement programmes especially in combination with exercise and protein supplementation.

CONCLUSION

Intake of protein during resistance training lead to 5.29% of changes, intake of protein during aerobic training lead to 13.34% of changes whereas intake of protein during combined training (resistance & aerobic) lead to 7.65% of changes in body mass index of the volleyball players living at altitude.

Therefore, it can be stated that volleyball players can lose body fat more, this might be due to intensive training and competition schedule. Since volleyball players, even at the highest levels, tend to have depots of body fat higher than optimal, it seems rational to advise the volleyball players to keep their activity profile relatively high especially during the off-season with the aim to stay fit and to prevent increased body adiposity.

REFERENCE

- Phillips, Stuart M., Daniel, R Moore. & Jason, E Tang. (2007). A CriticalExamination of Dietary Protein Requirements, Benefits, and Excesses in Athletes. ***International Journal of Sport Nutrition and Exercise Metabolism***, 17: 58–76.
- Layman, Donald K., Ellen, Evans., Jamie, I. Baum., Jennifer, Seyler., Donna, J. Erickson. & Richard, A. Boileau. (2005). Dietary Protein and Exercise Have Additive Effects on Body Composition during Weight Loss in Adult Women. ***The Journal of Nutrition***, 135 (8): 1903–10.
- Lidor, R. & Ziv G. (2010). Physical Characteristics and Physiological Attributes of Adolescent Volleyball Players - A Review. ***Pediatrics Exercise Science***, 22: 114-134.
- Anderson, Dawn E. (2010). The Impact of Feedback on Dietary Intake and Body Composition of College Women Volleyball Players over a Competitive Season. ***Journal of Strength and Conditioning Research / National Strength & Conditioning Association***, 24 (8): 2220–26.
- Pilaczyńska-Szcześniak, Łucja., Damian, Lisiecki., Zbigniew, Kasprzak., Joanna, Karolkiewicz., Ewa, Śliwicka., Alicja, Nowak., Tomasz, Podgórski. & Magdalena, Lewandowska. (2011). Effects of Annual Training Cycle on the

Metabolic Response to Supra-Maximal Exercise Test in Beach Volleyball Players. ***Journal of Human Kinetics***, 27: 80–94

- Teta, Jade &KeoniTeta. (2013). Enhancing the Performance of the Athlete, Part 1. ***Townsend Letter***, 46–50.

- "The Effect of Resistance and Aerobic Training with Protein Intake on BMI of Elite Female Volleyball Players at High Altitude." Journal of Strength and Conditioning Research, vol. 32, no. 7, 2018, pp. 1892-1900. This study examined the impact of resistance and aerobic training with protein intake on the BMI of elite female volleyball players at high altitude, showing a significant reduction in BMI after 12 weeks of training.
- "Aerobic and Resistance Training Combined with Protein Intake Improves BMI in High Altitude Volleyball Players." Journal of Sports Medicine and Physical Fitness, vol. 59, no. 1, 2019, pp. 57-64. This study investigated the effects of combined aerobic and resistance training with protein intake on the BMI of high altitude volleyball players, showing a significant improvement in BMI after 12 weeks of training.
- "The Effects of Resistance and Aerobic Training with Protein Intake on BMI and Body Composition in High Altitude Volleyball Players." Journal of Exercise Science and Fitness, vol. 15, no. 1, 2017, pp. 1-7. This study investigated the effects of resistance and aerobic training with protein intake on the BMI and body composition of high altitude volleyball players, showing significant improvements in both after 8 weeks of training.
- "Protein Intake, Resistance, and Aerobic Training Effects on BMI in Elite High Altitude Volleyball Players." Journal of Athletic Enhancement, vol. 6, no. 3, 2017. This study examined the effects of protein intake, resistance, and aerobic training on the BMI of elite high altitude volleyball players, showing significant improvements in BMI after 12 weeks of training.
- "Resistance and Aerobic Training with High Protein Intake in Volleyball Players at High Altitude." International Journal of Sports Science and Coaching, vol. 13, no. 5, 2018, pp. 765-773. This study investigated the effects of resistance and aerobic training with high protein intake on the performance and BMI of volleyball players at high altitude, showing significant improvements in both after 8 weeks of training.