



## COMPARISON OF HILL RUNNING AND BACKWARD RUNNING ON ATHLETES

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### Abstract

Backward running is a common technique employed in the treatment of a variety of orthopedic and neurological diseases. Backward running training may offer some benefits especially in balance and motor control ability beyond those experienced through running and in hill running, the athlete is using their body weight as a resistance to push against, so the driving muscles from which their leg power is derived have to work harder. The purpose of this study to comparison of hill running and backward running on Athletes and to develop profile of Athletes on the basis of physical variables. To quantify contributions of individual muscles during hill running and backward running 38 male healthy subjects under 19 years of Lucknow region is participated in the study. For development of physical components eight weeks training in spring session are delivered related to backward running and hill running. Pre-test and post-test data is collected for comparison. Nonsignificant result occurred during standing broad jump. Significant result occurred during 600meter run which resembles explosive strength. Improve flexibility because of occurring significant result during analysis of bent knee sit-up

**Keywords:** Backward running, Hill running and Walking

### Introduction

Many factors such as decline of balance, lean body mass, decrease of muscular strength of lower limbs, weakening of visual, coetaneous, proprioceptive and vestibular senses may lead to falls. Backward walking/running technique prevalent in football, basketball, and tennis has recently gained popularity as a method for treating patellafemoral pain syndrome various studies on forward and BW have determined the effect of these trainings on biomechanical and kinesiological aspects however the basic sports performance components have not been looked upon. Interaction of the sensory system, the motor system and the muscularskeletal system play a great role among all the factors. Wei-Ya and Yan proved that the use of simple physical exercise, such as a backward running can improve balance, so it has beneficial effect for healthy Individuals. Some motor patterns are easy to describe in terms of e.g. translation and rotation, amplitude, and time. The main hypothesis tested by Winter et al. was whether backward running could be considered as a simple reversal of forward running. They suggested that backward running was a near image of forward running. Grasso et al. found that the kinematic results show simple temporal reversal of joint angles. Vilensky et al. noted that at identical walking speeds, backward running was characterized by shorter time of swing and support phase. However, EMG patterns seem to be significantly different between the two



movement directions. All simple or difficult movements, that are not habit, require different, not familiar motor control ability. Hence the purpose of this study was to compare muscle force distribution during forward running and backward running for person who does not walk backwards as training. Hill running has a strengthening effect as well as boosting your athlete's power and is ideal for those athletes who depend on high running speeds - football, rugby, basketball, cricket players and even runners. To reduce the possibility of injury hill training should be conducted once the athlete has a good solid base of strength and endurance. It builds muscles in your calves, quads hamstrings, gluteus and hip flexor .Play is an essential facet in the Physical, Physiological and Psychological development of child. Play includes sports and games. Sports are generally individualistic where the pattern of movements does not change as in athletics a runner goes on running in a same style with least change in a body movements. In games, movements change from one action to another action. They require more elaborate organization and strategies based on intense competition. There were two training variables Hill running and Backward running used to check the components of physical fitness on an athlete and comparison between them was determine the performance.

### **Materials and Methods**

To quantify contributions of individual muscles during hill running and backward running 38 male healthy subjects under 19 years of Lucknow region is participated in the study. For development of physical components eight weeks training in spring session are delivered related to backward running and hill running.

Pre-test and post-test data is collected for comparison.

**Data processing:** Totally, 38 young healthy male subjects participated in this study. Subjects were free from any musculoskeletal problems and had no recent or remote history of significant lower extremity injuries that might have affected their training. In addition, subjects were excluded from the study in case of any type of the visual or vestibular deficiency. Prior to study obtained informed consent from each participant, and also obtained the study protocol approval from the institution's ethical committee. Data of 38 Subjects are collected before training of eight weeks with the help of AAHPHARD test. After that Backward running and hill running (with the help of up-stairs and down-stairs) were demonstrated, and subjects were given sufficient practice to become confident. We allowed the subject to habituate to running on the unnatural movement respective to their group either hill running with one practice session or Backward running with two or more sessions. Once the subjects were comfortable running, participants walked both hill and backward on planed schedule for one hour per day till eight weeks. For collection of data (pre-test and post-test ) and comparison of data of physical components is described below. Data was collected by administration of standard tests for Physical variables after pretest before training and post test after training of hill running and backward running.

### **Statistical Technique**

The data was collect from 37 male from Navodaya Vidyalaya of Lucknow. T-test was use for comparisons between physical fitness



components on Athletes. The level of significance was set at 0.05.

The tester competency was evaluated together with the reliability of the tests. To determine the reliability of tests the performance of subject selected at random on the selected variables were recorded twice under identical condition by the scholar.

TABLE 1  
DESCRIPTIVE STATISTICS 600 METER RUN OF MALE ATHLETES

Paired Samples Statistics			
	Mean	Std. Deviation	Std. Error Mean
Pre-test 600 meter run	1.817	.278	.045
Post-test 600 meter run	1.548	.306	.050

From above table we see that mean, standard deviation and standard error of pre test 600 meter run is 1.817, .278 and .045 respectively. Similarly mean, standard deviation and standard error of post test 600 meter run is 1.548, .306 and .050 respectively.

TABLE 2  
PAIRED T-TEST TO COMPARE 600 METER RUN OF MALE ATHLETES

Paired Differences of 600 meter run						
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T ratio	df
			Lower	Upper		
.269	.231	.038	.192	.346	7.074	37

From paired samples test table we see that t value is 7.074 with 37 degrees of freedom and p value is .000, which shows that null hypothesis is rejected and data is significant. Hence, we conclude that there is significant between pre test 600 meter run and post test 600 meter run.

TABLE 3  
DESCRIPTIVE STATISTICS KNEE SIT UP OF MALE ATHLETES

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pre-test knee sit-ups	32.675	38	10.255	1.685
Post-test knee sit-ups	39.378	38	14.638	2.406

From above table we see that mean, standard deviation and standard error of pre test knee sit up is 32.675, 10.255 and 1.685 respectively. Similarly mean standard deviation and standard error of post test knee sit up is 39.378, 14.638 and 2.406 respectively.

TABLE 4  
PAIRED T-TEST TO COMPARE KNEE SIT UP OF MALE ATHLETES

	Paired Differences of knee sit up					T	df
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Pre-test post - test	6.702	7.291	1.198	-9.133	-4.271	5.592	37

From paired samples test table we see that t value is 5.592 with 37 degrees of freedom and p value is .000, which shows that null hypothesis is rejected and data is significant. Hence, we conclude that there is significant between pre test knee sit up and post test knee sit up.

**Comparative Result:** When comparing these measured differences among modes of backward running and hill running on physical components, results are:-



- Nonsignificant result occurred during standing broad jump.
- Significant result occurred during 600meter run which resembles explosive strength.
- Improve flexibility because of occurring significant result during analysis of bent knee sit-up.

### Discussion and Findings of Result

Walking style represents a complex whose significance encompasses both the mechanical requirements of gait, such as: equilibrium, speed, and energy as well as the emotional aspects of life [9]. During hill and backward running muscles produce forces which act directly on the skeleton. These forces influence whole body movement, as ground reactions because the effects of muscle force to be transmitted to segments remotely from the muscular contraction. This effect is referred to as "dynamic coupling". Understanding the complex mechanisms behind normal gait is challenging. The main aim of this study was to quantify the difference in the leg muscle force patterns during forward running and backward running, and validation of muscle force distribution by EMG signal. However, the relationship between EMG and muscle force is not trivial. To do this, RMS and correlation coefficients were used. Błażkiewicz and Wit proved that correlation coefficients and RMS are good methods in comparison with the closeness of the two curves in the shape. They performed comparative analysis of sensitivity of four methods: waveform parameterization, correlation coefficients, RMS and IAE (Integral Absolute Error) in order to compare joint angles with reference curve. The sample scores obtained in this work provide important information about closeness in the shape of two curves. Moreover, authors encourage

using multiple techniques of data analysis. Regarding the gait analysis, most publications concern the analysis of muscle forces, muscle activity, kinematic and kinetic parameters during simple running. For hill running and Backward running mixed results were reported. Grasso et al. suggested that the preservation of kinematic templates for the motion of the joints between backward running and hill running was reflective.

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