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The Relationship of Hill Training With Stride Rate among Under 17 Year Athletics Trainees

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INTRODUCTION

In the study of Gottschall and Kram, 2005, the subjects run at 0, 3, 6, and 9% slope at a constant velocity. He reported a slight decrease in SL and an increase in step frequency as the slope increased. We assume that kinematic parameters, and metabolic factors, may contribute to the running performance. Moreover, a specific training on slopes to improve cardiovascular conditions and to increase strength is used by distance runner (Minetti *et al.,* 1994).

When running uphill, increase stride rate and shorten your stride slightly, which will keep your center of gravity over or slightly ahead of your lead foot, and lift your knees a little more than usual on the flats. Also, increase your arm swing slightly. Driving the arms a little harder will help to overcome the pull of gravity. When running downhill, lengthen your stride a little and pay attention to your foot strike. Avoid a hard heel strike, which indicates that you are leaning back and over striding with your knees too straight or locked and a lot of shock transmitted to your legs, knees, and hips. Try to land mid foot or forefoot with your knees flexed. A gentle heel strike followed by a quick roll onto the forefoot is ok if "forcing" a mid foot landing isn't comfortable. Unlike running uphill, an exaggerated arm swing is counter-productive when running downhill. Gra

SELECTION OF SUBJECTS AND COLLECTION OF DATA

The random sampling technique was used to select the sample with predetermined criteria's of the study. Based on the above sampling technique, criteria's and parameters 50 participants (25 male and 25 female) was selected for the study and these participants were divided in to two groups the 25 experimental and the 25 control groups and they have to participate or engage in the eight weeks training program. Having this size of the study was based on the reason that practical activities with large size of population is too difficult to manage during exercise that was affect the quality of data. As a result this size (50 participants) of the sample was selected from the total population of 100 male and female under-17 athletics

EXPERIMENTAL DESIGN

The experimental design with two groups (control and experimental groups). These experimental groups participated in the training program and the control groups did not participate in the training program. Pre- and post test will take to the experimental and control groups. The training will be there from April to June for eight weeks with the frequency of three days per week and the duration was for 40 minutes per session because of they are not beginners they have been two years training experience no need of to start from the basic running techniques so, it is possible to provide the training plan easily.

Table 1 the study design layout

Treatments	hill training
Frequency	3days/week
Total duration	8 weeks
Duration /session	40 minutes
Intensity	85- 95%HR_{max}
Exercise days	Saturday (morning), Tuesday and Thursday (afternoon)
Time of training	Morning (6:20-7:00 a. m); Afternoon (4:30-5:10 P. m).

PROCEDURES OF DATA COLLECTION

Stride rate: stride rate is the number of strides in a minute. This also needs a distance measured in meter (30 meter) the sprinter was running through this distance then we can count the number of strides per time or distance. The number of times a step is taken with a particular leg between 30 meters and 60 meters is ascertained, using two counters (one counter per leg). Add number of steps taken for each leg and divide total by flying 30-meter dash time. For example, 8 with right leg + 7 with left leg = 15 strides. 15 strides divided by 5.0 seconds between 30 and 60 meters = 3.00 strides per second (Derse *et al*., 1995).

RESULTS AND DISCUSSION

To investigate the relationship of hill training to the stride rate among the under-17 athletes . The hill training program was provided for two months with the frequency of 3days/week for 40 minutes per session. The selected physical fitness variables were measured two times: before or pre training test and after or post training test and the trainees were divided in to control and experimental groups randomly. The variables which were measuring for the study was stride rate. The data was analyzed through paired t-test. The results for each variable are discussed as follow:

Table 1. The pre and post training test results for the variables of stride rate of these female control and experimental groups (Mean ± SD).

Dependent Variables	group	PT	PoT	Sig.
Stride rate	control	3.89 ± 0.21	3.95± 0.34	0.04*
	experimental	3.92 ± 0.18	4.48 ± 0.38	0.01*

PT = Pre-training Test; PoT = Post training Test, p < .05 * = *Significant and the data in the form of Mean ± SD (standard deviation).*

The data (Table 1) showed that there was significantly improvement in stride rate among the under-17 **athletes** female trainees. The experimental groups showed the enhancement in performance. The rationale behind the improvement in performance was due to the well programmed and organized training which was conducted for two months. But the main purpose of this study was to investigate and compare the effect of hill training program on stride rate between the experimental (these who was done their training on hill) and control (these who was perform their training on track or ground)groups.

The pre and post training test mean values for Stride rate showed that significant difference in performance between the two groups (i.e. the experimental and control groups). Therefore, the pre and post mean values of stride rate for control group was 3.89 and 3.95 and for these experimental group was 3.92 and 4.42 respectively. So the mean difference between pre and post training values was 0.06 for these control groups and 0.50 of these experimental groups.

Table 2. The pre and post training test results for the variables of stride rate of these male control and experimental groups (Mean ± SD).

Dependent Variables	group	PT	PoT	Sig.
Stride rate	Control	4.41 ± 0.30	4.60 ± 0.35	0.30*
	experimental	4.23 ± 0.22	4.93 ± 0.25	0.05*

PT = Pre-Test and PoT = Post Test, p < .05 * = *Significant and the data in the form of Mean ± SD*

Table 2 showed that The pre and post training mean a value of stride rate was 4.41 strides/sec and 4.60 strides/sec these control group and 4.23 strides/sec and 4.93 strides/sec for these experimental group respectively. So, the mean difference between pre and post training values was 0.21 strides/sec for these control groups and 0.71 strides/sec these experimental groups. This difference was showed that the stride rate of athletes those engaging in hill program or the experimental groups registers 0.51 strides/sec better performance improvement than the control one.

Table 3 the female paired differences of both the control and experimental groups

Dependant variables	Groups	
	Control group	Experimental group
Stride rate (strides/sec)	0.06 strides/sec	0.56 strides/sec

Table 3 showed that there was significantly an improvement in stride rates that we have test among the female experimental groups than the female control groups does. So this increment in stride rate tells us the effect of hill training has dominantly affect these variables because the groups which were done their training on hill (the female experimental groups) shows absolute change in the different variables provided than the athletes there was performing their training on the track (the female control groups).

Table 4 the male paired differences of both the control and experimental groups

Dependant variables	Groups	
	Control group	Experimental group
Stride rate (strides/sec)	0.21 strides/sec	0.71 strides/sec

Table 4 showed that there was significantly an improvement in stride rates that we have test among the male experimental groups than the male control groups does. So, both of these tables (table 3 and table 4) showed that male and females experience a better performance enhancement the stride rate than the control groups. So, this showed that 95% Confidence Interval of the Difference. This is due to hill training on stride rate among the u- 17 **athletes**

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This research was conducted on fifty male and female under – 17 athletics project trainees' aged 15-16 years. All subjects under study took part in an organized training program; these experimental groups were exposed to hill training program with appropriate intensity, duration, and type of exercise and load of exercise**.**

This study assessed and tried to investigate the relationship of hill training with stride rate among under 17 year **athletes**. Major findings of this investigation were the increment or the improvement of stride rate. For this study the ways of measuring performance tests of stride rate the sprinter was running through this distance then we can count the number of strides per time or distance. The analysis of data were done through paired t-test to see the difference if any. The level of significance was set at 0.05.
As the tests result indicated that there was progressive improvement in performance from pre-test to post test due to the hill training program. The tests results showed that statistically significance enhancement observed in the participants' stride rate.

Conclusions

Based on the major findings of the study, these points were stated as conclusion:

hill training programs or exercises contribute to the improvement of stride rate among the under 17 **athletes**. As a result this study found that there was progressive improvement in stride rate after two months training periods.
Therefore, sprinters those participating in hill training (the experimental groups) were more advantageous in stride rate. So females shows improvement in performance by 0.07m/s, 0.04m/s^2 and 0.5strides/second of their stride rate respectively greater than those who were engaged in track or flat surfaces. And also males shows good performance in stride rate 0.50strides/sec greater than the control groups.

Biomechanically running uphill forces the athletes to run with shorter strides to keep the center of gravity of the body, helps to run with feet, to lean forward slightly, to add an additional load on the body specially the lower body parts, to coordinate the leg hand movements etc. all these

biomechanical effects of hill training helps an athlete to run with the basic running techniques of sprinting. Therefore, due to these effects of hill training athletes who were participated in this shows improvements in strides .

Recommendations

Based on the results of study, these recommendations are made:

1. Coaches should include uphill training program in their training plan in order to improve the sprinters stride rate by applying additional resistance and biomechanical running techniques. Emphasis should be given to enhancing in stride rate have an influence on the sprinters speed and acceleration too. Because stride rate have direct interaction with the speed and acceleration so, this can be improved by participating in uphill running.
2. Uphill training forces the sprinters to run with resistant so this was important to decreased stride length had valuable change to stride frequency and increased muscular force output, especially at the hip, knee, and ankle and increase the speed & acceleration as well. This indicates a high level of fast force production in top sprinters and reaffirms the importance of strength during the acceleration phase of sprinting which, one can get through resisted speed training or uphill training.
3. Decreasing in stride length can helps the sprinter to run fast by reducing the contact time between the leg and the ground, to develop the sprinting techniques, to hold body balance by engaging them in uphill training programs.

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