

EFFECT OF ENDURANCE TRAINING VS STRENGTH TRAINING AND ENDURANCE TRAINING IN NON RUNNERS

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ABSTRACT: Introduction: Now a days people are getting more and more aware about health and fitness. Day by day the runners are also increasing. But runners may follow haphazard methods to improve their running, that may be potentially damaging to muscles and joints if appropriate methodology is not followed. There should be systemic approach for runners to achieve endurance goals. **Methods:** Total 60 subjects were divided in two groups. Group A was exposed to endurance training only. Group B was exposed to endurance training along with strength training and results of improvements are recorded in both the Groups. **Result:** On comparison of both the groups it is found that group B (Endurance with strength training) has got significant improvements in their running distance than Group A. Though Even in Group A we observed improvements in running distance but was lower compared to Group B. **Conclusion:** For runners to improve their running distance they should include strength training exercises at least twice a in their weekly schedule. But the sets of strength training exercises needs further detailed study.

Key Words: Strength training

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Introduction: Now a days people are getting more and more aware about health and fitness. Out of all Running is one of the most important aerobic exercise that provides enormous benefits to the society¹. Day by day the runners are also increasing. But runners may follow haphazard methods to improve their running, that may be potentially damaging to muscles and joints if appropriate methodology is not followed². There has been a very few researches done in this subject. Some research shows that endurance training may not be sufficient for the runners. Along with strength training endurance training may improve running performance better than endurance training alone³. It is noted that runners were hesitant to strength training because of possible side effects due to hypertrophy and weight gain⁴. However strength training may be helpful due to more stability of joints and more force generation along with endurance training.

Mehtods: A total of 60 subjects were selected for the study. The subjects were selected on the basis of following criteria

- Daily walkers (Walk 30 minutes a day at least 5 days a week)
- Age group of 25 to 45 years
- Body mass index of subjects is between 23.5 +/- 3 kg/m²
- Subjects were healthy with no neuromuscular , joint disorders or any metabolic disorders

Now these subjects were randomly divided in two groups. Group A subjects are exposed to endurance training only and Group B subjects were exposed to endurance training with strength training. The subjects have to follow the exercise schedule atleast 5 days a week for 6 weeks in the morning. For each run all subjects should run with a minimum speed of 6.5 kms per hour. All subjects should have single run every day without any pause. Training period is same for all the subjects to reduce the

environmental influence. Endurance training for both group was in the form of Running only.

Subjects of both groups ran on the first day according to their capability. The kilometers they ran was noted down for all subjects. Group A subjects ran every day (at least 6 days a week) for six weeks. They gradually increased their running distance according to their capacity. They are allowed to put their maximum efforts on running but they have to fulfill the criteria for their consistency of at least six days a week. A maximum of 3 dropout day were allowed in a duration of six weeks. Group B was also exposed to exercise for six weeks. But Group B subjects have to do endurance training for 04 days a week and strength training exercises 02 days a week for six weeks. Strength training exercise includes

Table 1

Group of Muscles	Exercise
Hip extensors	<ul style="list-style-type: none"> • Forward Plunge • Donkey kick • Bridging⁵
Knee flexors and extensors	<ul style="list-style-type: none"> • Kneeling Corner curl • Standing corner curl⁶
Ankle Planter flexors (Calf Muscles)	<ul style="list-style-type: none"> • Straight leg calf raise • Jump rope⁷
Ankle Dorsi flexors	<ul style="list-style-type: none"> • Standing heel Lift⁸

Group B subjects have to do 2 sets of 10 counts for each exercises for two days a week for two weeks.

Then for the next two weeks 3 sets of 15 counts for each exercises for two days a week for two weeks.

For the last two weeks subjects have to do 4 sets of 20 counts for each exercise two days a

week. A maximum of 3 dropout of running day were allowed in a duration of six weeks. Distance was noted in run keeper application in mobile each day. At the end of six weeks subjects were allowed to run maximum according to their capability on that day. All the subjects were given 300ml orange juice 30 minutes before run. Running distance was noted in runkeeper application.

Observation and Result :

All the subjects were followed for six weeks. The running distance on the first day and last day was compared in the following table. It was noted that subjects in the both groups were found to increase their running capability after six weeks. But subjects in the group B had covered much better running distance compared to group A subjects on the judgement day. It clearly suggests that for runners strength training along with endurance training is a better option than only endurance training. Though further detailed study is required to evaluate the levels of benefits with strength and endurance exercise.

Table 2

	GROUP A (Distance in Kms)	GROUP B (Distance in Kms)
On the First day of Training	2.40+/- 1.0	2.56+/- 1.1
At the end of Six weeks of training	8.90 +/- 3.0	14.30 +/- 2.5

P value <0.001

Discussion: The study shows that strength training along with endurance training improves long distance running performance in the subjects. Few studies have been conducted related to this topic . Similar results have been found in a study done by Yamamoto L M,

Rebecca M Lopez et al. They found that resistance training (strength training) in endurance runners have significantly improved their performance in highly trained runners⁹. In a study done by Keta Uchiyama et al the result is contrary to our study. It shows that endurance training alone is more effective to prolong exercise time than strength training Title: Effect of Muscle strength Training and Muscle Endurance training on muscle deoxygenation level and endurance performance¹⁰). Bazylar et al in his study found that High force low velocity exercise is recommended initially to develop neuromuscular base limited strength training experience. The study name is Strength training for endurance athletes theory to practice¹¹.

Richard C Blagrove et al concluded that the addition of two-three strength training sessions per week are likely to provide benefits to the performance of middle and long distance runners. Also in distant runners measures relating to body composition are not negatively impacted by strength training intervention in his study named 'Effects of strength training on the physiological determinants of middle and long distance running performance'

Thomas W Jones et al concluded that to optimize performance gains preactitioners supporting adolescent middle distance athletes should consider implementing strength training in his study. (Ref: journal of human sports and exercise vol 13 issue 4 2018 p 843-857 title: Influence of concurrent strength and endurance training intervention on running performance in adolescence endurance athletes

Conclusion: At the end of our study we are able to conclude that for endurance only endurance training may improve the results but Endurance training along with strength training of lower limb muscles especially mentioned in table 1 definitely is a better option than endurance training alone. Also these kind of strength

training exercises may also improve the stability of joints better and help to prevent injuries

References:

1. Richard Weil, aerobic exercise definition, types, list, benefits on Medicine Net
2. American academy of orthopedic surgeons – tips for safe running program accessed 14/3/2018
3. : PLOS one mar 2016 p 1-18 by Olav Vikmoen et al, Effect of heavy strength training on running performance and determinants of running performance in female endurance athletes
4. Jon Williams may 17 2019 on live strong.com
5. Juseung kim et al, Journal of physical therapy science 2016 sep 28 (9) 2537-2540
6. Charushila Biswas ISSA certified specialist in fitness nov 2019 – top 20 knee strengthening exercises
7. reviewed by Tyler wheeler, MD jul 2019 on webmd
8. American Council on exercise,: Standing Calf Raises
9. Yamamoto L M, Rebecca M Lopez et al, Journal of Strength and conditioning research, The effects of resistance training on endurance distance running performance among highly trained Runners Nov 2008 pg. 2036-2044
10. Keta Uchiyama et al, Title: Effect of Muscle strength Training and Muscle Endurance training on muscle deoxygenation level and endurance performance J. Phys.Ther.Sci. 23, 349-355, 2011,
11. Bazylar et al , Title: Strength training for endurance athletes theory to practice Strength and conditioning journal Apr 2015 vol 37 issue 2 p1-12.
12. Richard C Blagrove , Title: Effects of strength training on the physiological determinants of middle and long distance running performance sports med (2018) 48: 1117-1149

13. Thomas W Jones et al, Title: Influence of concurrent strength and endurance training intervention on running performance in adolescence endurance athletes journal of

human sports and exercise vol 13 issue 4
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