P-ISSN: 2709-6254	Journal of Development and Social Sciences	April-June 2022,Vol. 3, No. 2
O-ISSN:2709-6262	http://dx.doi.org/10.47205/jdss.2022(3-II)25	[254-261]

JDSS Journal of Development and Social Sciences
www.jdss.org.pk

RESEARCH PAPER

The Impact of Static Stretching on Energy Cost and Running Endurance Performance of Female Athletes of University of Narowal, Panjab, Pakistan

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PAPER INFO

Received:
February 28, 2022
Accepted:
April 10, 2022
Online:
April 15 , 2022
Keywords:
Flexibility,
Muscle Stiffness,
Rating of Perceived Exertion,
Sit-And Reach

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ABSTRACT

The purpose of the research study, Stretching before anaerobic events has brought about decreases in performance; be that as it may, the quick impacts of stretching on endurance performance have not been explored. This study researched, the impacts of static stretching on energy cost and endurance performance in prepared female sprinters. Ten prepared female distance sprinters matured years 25±7 with a normal VO2max of 63.8 ± 2.8 ml/kg/min were selected. Participants answered to the lab on 3 separate days. On day 1, anthropometrics and VO2max were estimated. On days 2 and 3, participants played out an hour-long treadmill run randomly under stretching or non-stretching conditions isolated by no less than multi week. Stretching comprised of 16 minutes of static stretching involving 5 activities for the significant lower body muscle gatherings, though non-stretching comprised of 16 minutes of quiet sitting. The run comprised of a 30-minute 65% VO2max preload followed by a 30-minute performance run where participants ran beyond what many would consider possible without review distance or speed. Total calories used were determined for the 30-minute preload run, while performance was estimated as distance canvassed in the performance run. Performance was essentially more prominent in the non-stretching (6.0 6 1.1 km) versus the stretching (5.8 ± 1.0 km) condition (p, 0.05), with altogether more noteworthy energy consumption during the stretching contrasted and the non-stretching condition (425 ± 50 versus 405 ± 50 kcals). Our discoveries recommend that stretching before a n endurance occasion might bring down endurance performance and increase the energy cost of running.

Introduction

This study researched, the impacts of static stretching on energy cost and endurance performance in prepared female sprinters. Stretching related to physical fitness; it supports blood stream and assists with performing better in exercises and competitions for athletes. During exercise muscles repeatedly contract and relax by performing capacities at various joint. Ten prepared female distance sprinters matured years 25±7 with a normal VO2max of 63.8 ± 2.8 ml/kg/min were selected.

The ability to effectively use energy is a critical component of endurance performance, particularly among elite athletes. In fact, previous studies have reported a strong association between running economy (RE) (i.e., lower energy consumption at a given velocity) and long-distance performance. Furthermore, RE seems to be the most important variable to discriminate top-level athletes in a homogeneous group of long-distance runners. Stretching related to physical fitness; it supports blood stream and assists with performing better in exercises and competitions for athletes. During exercise muscles repeatedly contract and relax by performing capacities at various joint. Thus, training routines should avoid exercises that may increase the energy cost needed to maintain a given velocity or to complete a performance task.

Literature Review

The ability to successfully utilize energy is a basic part of endurance performance, especially among world class athletes. Truth be told, past investigations have detailed a solid relationship between running economy (RE) (i.e., lower energy utilization at a given speed) and significant distance performance. Moreover, RE is by all accounts the main variable to separate high level athletes in a homogeneous gathering of marathon runners. Subsequently, training schedules ought to stay away from practices that might build the energy cost expected to keep a given speed or to finish a performance task. Static extending practices are a typical piece of the warmup routine of a few athletes and active work experts trying to further develop performance and decrease the gamble of injuries.

In any case, static stretching appears to intensely diminish muscle-force creation limit. For example, static stretching has been displayed to diminish leg press 1-redundancy maximal tests, 20-m run performance, vertical bouncing stature, and knee-extensor concentric force. Notwithstanding this intense impact, Fowles announced a lingering impact in which most extreme plantar flexion force stayed discouraged even an hour after the extending schedule. These decrements in performance are credited to more noteworthy pressure unwinding of the muscle tissue, which prompts lower muscle-ligament stiffness and strength.

Yamaket al., (2018), Diminishing strength and muscle-ligament stiffness might be prejudicial to endurance sprinters on the grounds that Armanazi's et al, detailed that individual with high muscle strength and muscle-ligament firmness are more effective (i.e., higher RE) than individuals with low muscle strength. Consequently, it appears to be sensible to recommend that as static stretching diminishes force creation and muscle ligament stiffness, for as long as 60 minutes, it might increment energy utilization during an endurance occasion, diminishing the performance of prepared athletes. The motivation behind the current review was to research the impacts of static stretching on endurance performance and total energy cost estimated in calories exhausted on a treadmill in prepared significant distance male sprinters.

Dabbaghet al., (2018) Stretching related to physical fitness; it supports blood stream and assists with performing better in exercises and competitions for athletes.

Abolhasani, (2018), During exercise muscles repeatedly contract and relax by performing capacities at various joint Stretching exercises largely utilized, as the training or contest warm-up routine executed to prepare the musculoskeletal system before any sport performance, because of stretching muscles expanded and relax as it maximizes muscle engagement for the following exercise.

According to Hesselet al., (2017). There are further a few kinds of stretching exercise like Static, Dynamic, Ballistic and Proprioceptive Neuromuscular facilitation (PNF stretching) and so forth. In warm up we for the most part utilize dynamic stretching exercises because it is easy to perform, however many examinations recommend that this form of stretching during warm up has undesirable impacts on performance (Strength, Power and Speed and so on) (Jan &Yaday, 2017) and mechanism include here of performance decline is to include both mechanical and neurophysiological changes

Material and Methods

In this research, Experimental Method has to the Problem, the research study had a hybrid plan wherein participants went through a control and an experimental condition in a balanced design. In the control condition, participants had sit-and-arrived at performance surveyed when quiet sitting, trailed by a 30-minute preload run at 65% of the VO2 max and a 30-minute performance run at a self-chose speed. In the experimental condition, participants followed similar strategies however performed inactive static stretching practices between the sit-and-arrive at appraisals as opposed to sitting quietly. Caloric consumption during the preload and performance runs were looked at between the control condition and the static stretching condition to evaluate eventual misfortunes of running efficiency.

Ten female center and marathon runners (age 25 ± 7 years) with a normal VO2 max of 63.8 ± 2.8 ml/kg/min and muscle to fat ratio % of 6.9 ± 2.0 % were enlisted for the review from Florida State University running and marathon crews. Models for acknowledgment in the review incorporated a VO2max ≥ 55 ml/kg/min, a base training normal of 20 miles/wk, and later (≤ 90 days) investment in a competitive endurance running occasion (≥ 5 km). Evaluating for week-by-week mileage run and ongoing competitive history was acquired by telephone before any testing. All sprinters were individuals from the University of Narowal, Olympic style events group and had a day-by-day endurance training plan, as a feature of their slow time of year training schedule. Likewise, they performed stretching practices consistently. Participants were educated regarding the experimental dangers and marked an educated assent report before the examination. The examination was supported by an Institutional Review Board for utilization of Human subjects.

Initial Measurements

Participants answered to the research center on 3 separate events, isolated by at least 1-week interval to control for the particular day and time the experimental convention was performed. Subjects were approached to forgo extreme exercise 48 hours before each visit. On the main visit, subjects' body arrangement was assessed utilizing the amount of 3 skinfolds for female. VO2 max was determined on an engine driven treadmill (ErgoXELG3, Woodway Waukesha, WI) utilizing an ever-evolving exercise test to depletion convention as depicted already. Gas trade, caloric consumption, and ventilatory parameters were estimated by circuitous calorimetry utilizing a metabolic estimation framework (Parvo doctors Truemax 2400, Consentius Technologies, Sandy, UT). Pulse was checked utilizing a pulse screen (Polar Electro, Lake Success, NY). After the VO2 max test, the running velocity related to 65% of participants VO2max was determined by walking the participants at 6.4 km/h for 1 moment, trailed by a 0.8 km/h increment every moment until the subject's VO2 values arrived at a consistent state at 65% of his recently recorded VO2max.

The experimental convention occurred on visits 2 and 3 and comprised of an hour-long sudden spike in demand for a similar treadmill. The hour-long run was fractionated into a preload and performance run. Participants started with a preload run for 30 minutes at 65% of their VO2max wherein metabolic estimations for caloric use was determined by open circuit roundabout calorimetry constantly and arrived at the midpoint of north of 30-second intervals. Total caloric consumption was acquired through the aggregate of the caloric use midpoints got on every 30-second interval. On completion of the preload run, the treadmill was halted and participants were detached from the metabolic truck. Between the preload and performance runs, participants were allowed as long as 2 minutes to drink water with the expectation that they would have to drink a similar measure of water during the rest time frame before their subsequent performance run at their next research center visit. During the 30-minute performance run, participants were approached to cover the longest distance conceivable. They were allowed to see the time show and to control the treadmill speed. In any case, participants were disallowed to realize the distance covered and the speed at which they were running, to stay away from psychological molding between the control and the stretching trials. Likewise, pulse and evaluations of seen effort (RPE) were required like clockwork for both the preload and performance runs.

Stretching Method

The stretching procedure that was utilized in the current review was like that of Nelson et al, and Egan et al. in any case, with a couple of alterations. Four, 30-second repetitions every one of 5 stretching exercises were performed with a normal total stretching season of 16 minutes. For the hip extensors and knee flexors, participants performed out the sit-and-reach, while the plantar flexors were stretched by standing and bringing down the two heels on the edge of a square. The accompanying stretches were performed independently on the two legs. For the knee extensor muscles, participants remained on one leg, while getting a handle on the lower leg of the contrary leg and pulling their knee joint into flexion until their heel contacted their bum. For the hip flexors, participants moved into a lurch position with 1 knee in touch with the mat, while tenderly moving their weight forward until they could feel a stretch of gentle distress in the hip flexors. For the gluteus maximus, participants got their left foot over their right knee while fastening their hands behind the right thigh and delicately pulling the leg in toward their chest. On completion, these stretches were rehashed on the contrary side. On non-stretching days, participants sat quietly for 16 minutes before the activity convention. A sit-and-arrive at test utilizing a Figure Finder Flex-Tester sit-and-arrive at box (Novel Products, Inc., Rockton, IL) was performed before the 16-minute procedure and following to determine changes in scope of movement. The score of the sit and reach was determined from the best of 3 reaches.

Dietary Control

To control for diet, participants tracked their diets (all food and drinks) for 72 hours before the first analyze they partook in. The diet was then given to the subject with guidelines to repeat the food utilization for 72 hours before the second doled out test. Participants were also trained to downplay action and to not perform out any difficult exercise 48 hours before the testing time frame.

Statistical Analyses

The impact of the static stretching routine on the sit-and-reach performance was tried with a 2 × 2 (trial × time) rehashed measures analysis of difference (ANOVA). Potential impacts of static stretching on total caloric consumption, on both the preload and

performance runs, were evaluated utilizing matched t-tests (i.e., no stretching × stretching condition). A 2 × 7 (bunch × time) rehashed measures ANOVA and a 2 × 6 (trial × time) rehashed measures ANOVA were utilized to test for contrasts in pulse and RPE, separately, during both the 30-minute preload and 30-minute performance runs. Whenever a critical F-value was gotten, a Tukey post hoc test was performed for a considerable length of time purposes. Importance was acknowledged at $p \leq 0.05$. Information are accounted for as mean and SD in the tables and as mean and standard mistakes in the figures. The statistical systems were performed utilizing the product Statistical and the degree of importance was set at $p \leq 0.05$.

Results and Discussion

Flexibility Sit-and-reach normal values expanded fundamentally after the stretching exercises from 24.7 ± 14.6 to 27.2 ± 14.6 cm (p # 0.05) and didn't change (25.2 ± 14.6 to 25.5 ± 14.6 cm, p . 0.05) after the quiet sitting.

Distance Run

After the stretching works out, the mean distance run was altogether more noteworthy (3.4 %) in the non-stretching (6.0 ± 1.1 km) versus the stretching (5.8 ± 1.0 km) condition (þ ≤ 0.05). Individual subject information is plotted in Figure 1, which graphically shows that 8 of 10 participants pursued further quietly sitting as contrasted with about the stretching with a scope of 0.2-0.5 more kilometers covered.

Energy Cost

The normal speed run at 65% VO2 max was 10.1 ± 1.6 km/h (Table 1). After the stretching works out, the mean energy exhausted was essentially more noteworthy in the stretching (425 ± 55 kcals) vs the non-stretching (405 ± 53 kcals) condition (p ≥0.05).

Table 1

Distance Run and energy cost

Age (Y)	Height (cm)	Weight (kg)	%BF	Vo2max (ml/kg/min)	65%Vo2max speed (km/h)
25.0 ± 7.0	173.4 ± 11	65.0 ± 18.0	6.9 ± 2.0	64.0 ± 2.8	10.1 ± 1.6

Values are means 6 SD, %BF = percent body fat; VO2max = maximal oxygen uptake; and max = maximal.

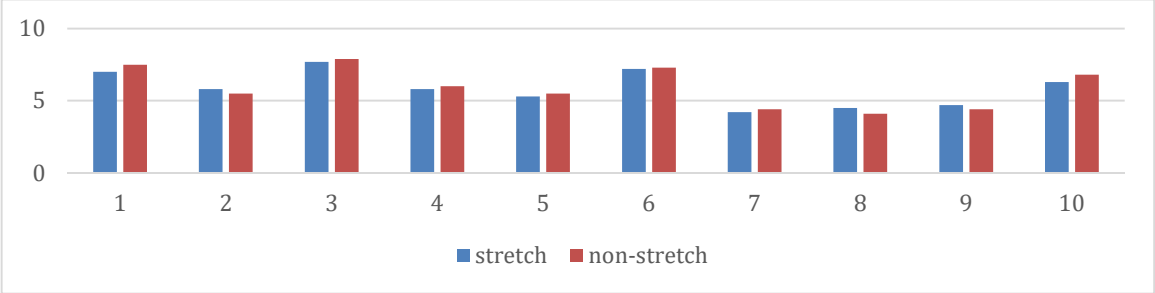

Figure 1. Distance run in 30 minutes for each subject under stretching and non-stretching conditions.

Discussion

The motivation behind this study was to research the impacts of static stretching on endurance performance and total calories used on a treadmill in prepared male sprinters. The primary discoveries in this study were that stretching brought down distance covered during a 30-minute performance run (Figure 1) and expanded the energy cost of running at 65% of the VO2 max trial.

Bacurau et al. announced a 12% enhance in the sit-and-reach performance after a static procedure. The noted augmentation was somewhat lower than our own (17%); in any case, they show that static stretching can intensely build the scope of movement in the target joints. It is also fascinating to see that intense stretching concentrates regularly don't report the progressions in scope of movement in the wake of stretching conventions, which restricts the ability to interpret our information. The higher energy utilization during the preload trial might show a diminished mechanical proficiency of the muscle framework, which is by all accounts upheld by the lower distance shrouded in the performance trial.

A subsequent limit incorporates a general absence of goal measures, for example, changes in stiffness and ground contact times to determine the actual systems fundamental stretching consequences for both the performance and the energy cost of running. In outline, this study gives 2 key discoveries concerning endurance performance after an episode of static stretching. To start with, it expands the detrimental impacts of stretching from exercises requiring high power and speed parts to the area of muscle endurance performance. Second, this exploration recommends that static stretching builds the energy cost of running at moderate-intensity work out. Subsequently, in occasions, for example, significant distance running, where achievement is connected with creating work with minimal energy cost, it very well might be negative for mentors to have athletes warm up in a way that has them perform long, static stretches preceding a center or significant distance running occasion. Further investigations should address the system behind the decrements in endurance performance after static stretching exercises.

Conclusion

The present research potential clarification for performance deterioration is that static stretching adversely influences the ability of the muscle tissue to deliver force. The decrement in inactive force after this kind of stretching demonstrates a diminished viscosity of the muscle tissue because of a more prominent pressure unwinding. These progressions are liable for the lower muscle-ligament solidness saw subsequent to stretching. During exercise muscles repeatedly contract and relax by performing capacities at various joint Arampatzis et al, revealed a solid positive relationship between muscle-ligament firmness and energy cost at a given speed. Hence, it is conceivable that decrements in muscle-ligament firmness after static stretching might have instigated an augmentation in the quantity of engine units selected to play out a similar mechanical work.

Recommendations

Static stretching has been utilized during the warm-up daily schedule of several athletes. In any case, our outcomes show that static stretching might debilitate endurance performance as long as an hour and increment caloric use. Despite the fact that the augmentations in caloric consumption were low (˜5%), it might deliver a benefit to the sprinter toward the finish of close competitions. In this manner, static stretching ought to be stayed away from before endurance occasions, essentially for youthful male endurance sprinters. The impact of different types of stretching (i.e., dynamic stretching) on endurance performance still needs to be tested.

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