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EFFECTIVENESS OF A CONCISE TRAINING REGIMEN FOR RECREATIONAL RUNNERS TO OPTIMIZE THEIR FUNCTIONAL OUTCOME: A STUDY PROTOCOL

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ABSTRACT

Background: Running is a popular form of physical activity that offers several health benefits; however, optimal running performance requires adequate core stability, balance, agility, coordination, and muscular power. A structured, time-efficient training programme incorporating these components may help improve functional performance among recreational runners.

Objective: To evaluate the effectiveness of a six-week training regimen targeting core strength, balance, and agility in optimizing functional outcomes among recreational runners.

Methods: A pre-test and post-test pilot study will be conducted at Mangalayatan University, Aligarh, in the Physiotherapy Outpatient Department and on the university synthetic ground. Purposive sampling will be used to recruit 16 recreational runners aged 18–54 years, allowing for an anticipated dropout rate. Eligible participants will be required to be actively engaged in regular running activities and willing to participate. The intervention will be conducted three times per week for six weeks, with each session lasting approximately 45 minutes and including warm-up, structured exercises, and cool-down. The training programme will incorporate exercises targeting core stability, balance, agility, and muscular power. Functional outcomes will be assessed before and after the intervention using the Illinois Agility Test, Standing Long Jump Test, Trunk Stability Test, and Y-Balance Test. Changes in test performance will be used to evaluate the effects of the training programme.

Expected Results: The intervention is expected to improve agility, dynamic balance, trunk stability, and lower-limb power among recreational runners. Improvements are anticipated in Illinois Agility Test performance, Y-Balance Test scores, trunk stability, and standing long jump distance following the six-week programme.

Conclusion: This pilot study is expected to provide preliminary evidence regarding the feasibility and potential effectiveness of a concise, structured training regimen for improving functional outcomes in recreational runners. The findings may help inform the development of time-efficient supplementary training programmed for recreational running. However, the small sample size and absence of a control group may limit the generalizability of the findings and the ability to establish causal effects.

KEYWORDS: Recreational runners, core stability, balance training, agility, functional performance, standing long jump, Y-Balance Test, pilot study.

INTRODUCTION

A runner is an individual who engages in running either as a sport or as part of competitive events, requiring minimal sport-specific equipment[1]. According to data from the International Association of Athletics Federations, approximately 107.9 million runners participated in nearly 70,000 race events worldwide in 2019, with participation increasing by nearly 60% over recent decades[2].

Running is associated with multiple health-related benefits, including a reduced risk of chronic diseases[3]. It also enhances blood circulation, which contributes to improvements in mental health and psychological well-being[4, 5]. As a widely accessible form of physical activity, running plays a significant role in maintaining public health and promoting overall physical fitness.

Several guidelines have been developed to recommend appropriate volume and intensity of physical activity for athletes and physically active individuals. Among the most frequently cited are those established by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA). To promote health and reduce the risk of health-related complications, these organizations recommend that healthy adults aged 18–65 years engage in moderate-intensity aerobic activity for at least 30 minutes on a minimum of five days per week, or vigorous-intensity aerobic activity for at least 20 minutes on three days per week. A combination of moderate and vigorous activity may also be used to meet these recommendations[6].

Most runners commonly train within clubs, teams, or group settings, thereby incorporating a social component into their training routine[6]. However, to achieve efficient sport-specific functional movement, it is essential to maintain adequate muscle strength, endurance, coordination, balance, and flexibility[7,8].

Running requires complex coordination and balance between the upper and lower extremities. The core region, comprising the trunk, pelvis, and hips, acts as a central link between these segments. Instability within this region may result in suboptimal performance and an increased risk of injury[9]. Core stability is therefore considered fundamental across all sports activities. Core training primarily focuses on improving strength and control of both superficial and deep muscle groups that work collectively to stabilize the spine. The superficial muscle group includes the rectus abdominis, oblique muscles, latissimus dorsi, and erector spinae, while the deeper stabilizing muscles include the transversus abdominis, multifidus, and pelvic floor muscles[10].

Previous studies suggest that core instability and muscular insufficiency can disrupt efficient energy transfer throughout the kinetic chain. This disturbance may lead to increased mechanical strain, overuse, reduced movement efficiency, and a higher incidence of injury[11,12]. Among runners, it is widely believed that core strength, balance, agility, and power are key determinants of improved performance and injury prevention[13]. Consequently, these components are frequently incorporated into strength training, general fitness programs, and rehabilitation protocols[14].

Agility and power development require the integration of multiple training modalities and cannot rely solely on core training. Nevertheless, adequate balance and agility are essential components of enhanced functional performance and have been shown to contribute to a reduced risk of injury[15,16,17].

Aim:

To determine the effectiveness of a training regimen for recreational runners in optimizing functional outcomes.

Objectives:

1. To quantify the effects of core training among recreational runners.
2. To evaluate the impact of balance and agility training on runners' functional performance.

MATERIALS AND METHODS:

Enrollment & Recruitment

The study will employ a pre-test and post-test pilot trial design to assess the feasibility of the proposed intervention. It will be conducted at Mangalayatan University, Aligarh, with study activities taking place in the Physiotherapy Outpatient Department (OPD) and the university campus synthetic ground. The study is planned for a duration of one year, from 2024 to 2025. Purposive sampling will be used to recruit participants who meet the predefined eligibility criteria. As this is a feasibility study, 12 participants are considered an appropriate target for assessing the study procedures. Allowing for an anticipated dropout rate of approximately 30%, a total of 16 participants will be recruited. Eligible participants will be males and females aged 18–54 years who are conscious, coherent, willing to participate, and actively engaged in recurrent running activities. Individuals intending to participate in races exceeding 3 kilometers will be excluded. Participants with a history of trauma, cardiovascular conditions such as hypertension or coronary heart disease, respiratory or pulmonary disorders, including lung cancer and pulmonary fibrosis, musculoskeletal disorders, or obesity will also be excluded. Before the commencement of the study, ethical approval will be sought from the Institutional Ethics Committee of the Mangalayatan University, and participant recruitment will be undertaken in accordance with the approved ethical procedures.

Outcome measure

1. Illinois test – The test had the width of 5m length of 10m and included three cones in a straight line at a distance of 3.3m from each other. The test was held on the campus ground. The test consisted of 40m straight runs every 10 m and slalom runs between cones every 20m.
2. Standing long jump- From the standing position, the double-leg front jump was measured in centimeters between the point of jump and the end of the long jump.
3. The trunk stability test – The participant will be sit on either a 65 cm or 75 cm Swiss ball with both feet on the ground. The ball size was, in part, determined by the height of the participant. It was essential that the ball in a neutral position (0 degree dorsiflexion), with the knees and hips at 90 degrees of flexion. Participants will be asked to sit up tall with their arms across their chest and extend one knee so that the heel of the lifted leg was at the height of the stationary ankle. Participants performed one 30 sec practice trial on each leg with their eyes open while attempting to maintain the position of the raised foot for the duration of the trial. Following the practice trial, three trials per leg were collected where the individual repeated the same testing procedure except with their eyes closed. If they moved out of the test position, they were to return to the test position as quickly as possible. Throughout the 30 sec trial, an examiner visually assessed and recorded deviation from the test position.
4. Y balance test- The following sequences were performed in right anterior and left anterior, right posteromedial, left posteromedial and left posterolateral. The participant stand on the center of the platform with their both hands on hips. The Participant is instructed to reach for word and return back to the starting position. The trial was considered invalid if the subject fails to maintain a single-leg stance, removes the hands from the hip and touches the ground.

a. Composite score = (Anterior + Posteriomedial+ Posteriolateral)*100

i.(3*limb length)

Intervention

Training Protocol for runners

During intervention, participants continued their training sessions for 6 weeks. Activities are performed 3 times a week for 6 weeks. The training regime consists of a warm-up phase, training part, and cool-down phase. The participant performs light stretching for 10 minutes and general limb movements for 5 minutes to warm up and to cool down. The interventional group performed each movement with 20 repetitions of 3 sets and a 1 min rest between sets (Table1). Pre-assessment is taken before the training session, and post-assessment will be taken after the training session. Follow-up of the same procedure is conducted after the training session is completed. In post-intervention, the Illinois test, standing long jump, Y balance test, and trunk stability test are used to estimate agility, balance, core strength, speed, and power performance, respectively. The training regimen lasted in 45 minutes approximately[22].(Table 2)

Figure – 1 (Pre–Assessment)

Figure – 1 (Post–Assessment)

RESULT

According to previous article, it is proved that the training regimen will leads a measurable improvement in recreational runners on their functional outcomes such as core strength and balance, agility and increases in standing long jump distances are also predicted. Participants are expected to show enhanced trunk stability as measured by the trunk stability test, due to targeted core exercises focusing on both superficial and deep stabilizing muscles. These expected results align with findings from prior studies on structured core, balance, and agility training in runners.

DISCUSSION

The present study evaluated the effectiveness of a concise training regimen in optimizing functional outcomes among recreational runners, with particular emphasis on core strength, balance, agility, coordination, and overall functional performance. Although multiple preventive and performance-enhancing training approaches are available for runners, there is limited evidence addressing the role of structured pre-training programs that

specifically target these functional domains. This study therefore contributes to addressing an important gap in the existing literature.

Previous research has demonstrated statistically significant improvements in speed, core strength, balance, and coordination following structured training interventions in athletic populations ($p < 0.05$)[23]. These findings align with the functional outcome measures selected in the present study, supporting the rationale for including multidimensional components within a concise training framework. Improvements in core strength are particularly relevant, as enhanced trunk stability facilitates efficient force transfer between the upper and lower extremities, thereby contributing to improved balance, coordination, and running efficiency.

Additionally, earlier studies report that endurance training, strength training, and aerobic conditioning independently and collectively produce significant improvements in functional performance outcomes ($p < 0.05$). Such evidence supports the inclusion of combined training elements in the present regimen, rather than reliance on isolated aerobic training alone. By integrating strength-based and neuromuscular components, the training approach evaluated in this study aims to enhance balance and agility—key outcome measures that are closely associated with movement efficiency and injury risk reduction in runners.

The growing participation of recreational and professional runners across varying distances further emphasizes the clinical relevance of these functional outcomes. Recreational runners often experience time constraints, making time-efficient training interventions particularly valuable. A concise training regimen that demonstrates measurable improvements in balance, agility, and core stability may therefore offer a practical solution for improving functional performance without excessive training demands.

Current physical activity guidelines recommend that healthy adults aged 18–65 years engage in moderate-intensity aerobic activity for at least 30 minutes on five days per week or vigorous-intensity activity for at least 20 minutes on three days per week, with a combination of both also considered acceptable[24]. While these recommendations primarily address cardiovascular health, they do not specifically account for sport-specific functional outcomes such as balance, coordination, and core stability. The present study extends beyond these general guidelines by evaluating functional measures that are directly relevant to running performance and injury prevention.

Overall, the findings of this study suggest that a concise, structured training regimen targeting core strength, balance, and agility may be effective in optimizing functional outcomes among recreational runners. Incorporating such pre-training interventions into routine running programs may help bridge the gap between general physical activity guidelines and the specific functional demands of running, thereby enhancing performance capacity while potentially reducing injury risk.

Limitation includes small sample size and lack of control group, limiting generability.

CONCLUSION

Structured six- week training regimen effectively improves functional outcomes in recreational runners. Integrating such programs into routine training may enhance performance and reduce injury risk.

Recommendation

Future studies should include larger sample sizes, control groups, and long- term follow- up to establish sustained benefits.

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Conflict of Interest- The author declare no conflict of interest**.**

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Ethical clearance: The study was undergoing ethical clearance from institution ethical committee of Mangalayatan university Aligarh with Approval reference number IBMER2024-AUG/002 on 25 September 2026.

Patient Consent declaration; Written informed consent was obtained from all participants for participation in the study and for publication of data for research and educational purposes.

Tables and figures;

Table 1- Training protocol

Table 2- Session structure

Authors Contributions

All authors contributed substantially to the conception, design data acquisition, analysis drafting, and critical revision of manuscript. All authors approved the final version and agree to accountable for all aspects of the work. All authors certify that the manuscript has been checked for plagiarism.

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TRAINING PROGRAMME FOR RUNNERS TABLE 1

Exercises	***Times***	***Repetition***	***Rest***
Squat	3	20	1
Sit up crunch	3	20	1
Cross crunch	3	20	1
Plank	3	20	1
Side plank	3	20	1

Back extension	3	20	1
Leg raise	3	20	1
V up exercise	3	20	1
Pelvic curl	3	20	1
Rotatory stability	3	20	1

TRAINING PROGRAM DESIGN (TABLE 2)

At the beginning of protocol Worm up exercise general limb movement stretching for 10- 15 minutes.

Week 1 to 3 (Fundamental strength)

S.N0	EXERCISE PROTOCOL	DURATION	SET/REP	ATHLETE POSITION	THERAPIST POSITION	PROCEDURE
1.	Squat	3 min	3/20	Standing	standing	Standing with your feet shoulder-width apart and slightly turned out to open the hip joint, place your hands on the back of your head. When your thighs are parallel to the floor, lower your body. After pausing, resume your original posture.
2.	Sit up crunch	3 min	3/20	Sitting	standing	Start by lying on your back with your knees bent. Put your fingertips on the back of your ears. Lift you torso up as close to your thigh as possible. Lower your torso down to the floor so you are back in the starting position.
3.	Cross crunch	3 min	3/20	Lying	standing	Stretch out of floor with your feet flat and your knees bent. Put your hands behind your head. The left knee is crossed over the right ankle. Exhale as you crunch. Like elevate your u/p body slowly off the mat while tightening your abdominal muscles.
4.	Plank	3 min	3/20	Lying with front	standing	Put your elbow under your shoulders and your feet hip- width apart to form a push up position. While keeping your body in a straight line, bend your elbow and place your weight on your forearm and toes.
5.	Side plank	3 min	3/20	Lying	standing	Same as above only put body in side lying and bend your elbow and place your weight on your forearms and toes.
6.	Back extension	3min	3/20	Lying with back	standing	Slowly extend your back in lying position.
7.	Leg raise	3 min	3/20	Lying	standing	In lying position both the legs are rise simultaneously.
8.	Rotatory stability	3 min	3/20	Sitting, lying	standing	Place feet vertically so that toes are on the ground. Toes, knee, and thumbs must make contact with the board. Reach your right arm forward and your right leg back at the same time.

						right knee and elbow should be drown back.
9.	Pelvic curl	3 min	3/20	Lying	standing	Your feet should be flat on the floor as you lay on your back with your knees bent. Ensure that your hip- distance apart and your feet, ankle, and knees are all in alignment. Start with your spine in a neutral position.
10.	V up exercise	3min	3/20	Standing	standing	Lay your back with your arms raised in the air. Keep your feet together and legs straight. Lift your feet roughly. Exhale as your torso and leg at the same movement to form Av- SHAPE.

Week 3 to 6 (Stabilization, Fundamental strengthening)

S.N0	EXERCISE PROTOCOL	DURATION	SET/REP	ATHELETE POSITION	THERAPIST POSITION	PROCEDURE
1.	Rotatory stability	3 min	3/20	Siting, lying	standing	Place feet vertically so that toes are on the ground. Toes, knee, and thumbs must make contact with the board. Reach your right arm forward and your right leg back at the same time. right knee and elbow should be drown back.
2.	Sit up crunch	3 min	3/20	Sitting	standing	Start by lying on your back with your knee. Put your fingertips on the back of your ears. Lift you torso up as close to your thigh as possible. Lower your torso down to the floor so you are back in the starting position.
3.	Back extension	3 min	3/20	Lying with back	standing	Slowly extend your back in lying position.
4.	Plank	3 min	3/20	Lying with front	standing	Put your elbow under your shoulders and your feet hip- width apart to form a push up position. While keeping your body in a straight line, bend your elbow and place your weight on your forearm and toes.
5.	Side plank	3 min	3/20	Lying	standing	Same as above only put body in side lying and bend your elbow and place your weight on your forearms and toes.
6.	**Cross crunch**	3min	3/20	Lying	standing	Stretch out of floor with your feet flat and your knees bent. Put your hands behind your head. The left knee is crossed over the right ankle. Exhale as you crunch. Like elevate your u/p body slowly off the mat while tightening your abdominal muscles.
7.	Leg raise	3 min	3/20	Lying	standing	In lying position both the legs are rise simultaneously.

8.	V up exercise	3 min	3/20	Sitting, lying	standing	Lay your back with your arms raised in the air. Keep your feet together and legs straight. Lift your feet roughly. Exhale as your torso and leg at the same movement to form Av- SHAPE.
9.	Pelvic curl	3 min	3/20	Lying	standing	Your feet should be flat on the floor as you lay on your back with your knees bent. Ensure that your hip- distance apart and your feet, ankle, and knees are all in alignment. Start with your spine in a neutral position.
10.	Squat	3min	3/20	Siting, lying	standing	Standing with your feet shoulder-width apart and slightly turned out to open the hip joint, place your hands on the back of your head. When your thighs are parallel to the floor, lower your body. After pausing, resume your original posture.