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Immediate Effect of Foam Rolling on Length of Lateral Lunge and Agility in Recreational Male Table Tennis Players

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Abstract:

Background: Table tennis demands rapid footwork, high-level agility, and expansive lateral mobility to return fast-paced, contralateral shots. Foam rolling a popular self-myofascial release (SMR) technique is widely utilized to increase flexibility and range of motion without impairing performance, yet its acute benefits within recreational table tennis player populations remain under-investigated.

Objective: To determine the immediate effects of an acute bout of lower-limb foam rolling on lateral lunge distance and agility in recreational male table tennis players.

Methods: An experimental study was conducted with 20 recreational male table tennis players (mean age: 22.15 years) selected via convenience sampling. Pre-intervention and post-intervention measurements evaluated agility using the Edgren Side Step Test and bilateral lateral lunge reaches using a standard tape measure. The intervention consisted of 90 seconds of self-administered foam rolling per muscle group over the adductors and tensor fasciae latae (TFL) bilaterally. Data were analyzed utilizing a paired *t*-test.

Results: Post-intervention data demonstrated highly significant improvements across all parameters ($p < 0.001$). The number of lines crossed during the Edgren Side Step Test increased from an average of 24 to 26, representing a 6-foot net gain in agility. Furthermore, right lateral lunge distance increased by an average of 10.27 cm, and left lateral lunge distance increased by an average of 11.33 cm immediately following the foam rolling protocol.

Conclusion: A brief, targeted protocol of lower-limb foam rolling significantly and immediately improves agility and lateral lunge reach in recreational players. Because it is simple, self-administered, and cost-effective, foam rolling serves as an excellent warm-up modality to optimize on-table movement and functional reach.

Keywords: Foam rolling; Self-myofascial release; Table tennis; Agility; Lateral lunge; Warm-up protocol; Range of motion.

Introduction

Table tennis is a modified form of tennis that uses a flat table-like surface instead of a court. The ball used was a lightweight plastic ball, along with small wooden rackets. This sport has gained a lot of popularity. It is played for recreational as well as professional purposes. The player uses different styles of strokes and footwork to return the opponent's serve and requires good reach across the table to return all the opponent's serves. Side lunge is one essential footwork portrayed by players when the ball comes on the field that is adjacent to the one the player is currently standing at. To reach to the ball, the player must side lunge effectively and quickly so as not to miss the ball.

Muscles required in side lunge are: prime movers, namely: gluteus medius, gluteus minimus and tensor fascia lata, along with secondary muscles like: sartorius, piriformis and superior fibres of gluteus maximus Apart from overall reach all over the table, another essential requirement is good agility of the player in order to change the position quickly and efficiently in order to return fast-paced shots from the opponent. Foam rolling is a form of self-myofascial release. This is a technique used to enhance mobility and reduce the onset of delayed onset muscular soreness (DOMS). In this study, the participant will be asked to perform foam rolling on himself on the Tensor fascia lata and adductors area bilaterally. Should there be any changes observed in the side lunge immediately post foam rolling, it can be added as one of the essential criteria of the participant's warm-up before playing the sport in order to enhance the player's performance.

Several other studies corroborate the effectiveness of foam rolling not just for athletic performance: For instance, a study focusing on badminton players demonstrated a significant increase in vertical height ($p < 0.001$) after foam rolling targeted at the quadriceps and hamstrings. Another study found that combining jogging with foam rolling led to superior improvements in ankle dorsiflexion and counter movement jump compared to jogging alone. Moreover, a separate study involving elite table tennis players showed that incorporating dynamic stretching alongside foam rolling resulted in enhanced flexibility, power, ball speed, and agility. These findings align with the outcomes of the current study, further supporting the notion that foam rolling can effectively optimise athletic performance. In table tennis, failing to reach the ball directed to the opposite side of the table often results in losing a point. Enhancing the length of the lateral lunge and agility of players can significantly improve their ability to reach and return such shots effectively.

If foam rolling proves effective in improving these aspects of performance, it could be incorporated into players' warm-up protocols. By increasing the length of the lateral lunge, players can extend their reach across the table, while improved agility enables them to move quickly and efficiently to reach for the ball. This can ultimately enhance players' overall performance on the table, allowing them to respond more effectively to opponents' shots and potentially reducing the likelihood of losing points due to the inability to reach the ball.

Integrating foam rolling into pre-match preparation can be a highly effective method for physically conditioning players, enabling them to refine their movement and boost their competitive output at the table. This research primarily aimed to assess how an acute session of foam rolling immediately impacts agility and lateral lunge reach among recreational male table tennis players between 18 and 25 years old.
The study objectives included:

- Quantifying the change in lateral lunge capacity before and after foam rolling using standard tape measurements.
- Evaluating agility levels pre- and post-intervention via the Edgren side step test.

METHODOLOGY

This experimental study, conducted in a community setting, utilized a convenience sampling method to recruit 20 recreational male table tennis players aged 18 to 25. Inclusion criteria required participants to play for at least one hour, three to five days per week, while individuals with lower limb musculoskeletal pain, fractures, soft tissue injuries, or neurological conditions were excluded. To conduct the research, tools including a measure tape, foam roller, sticking tape, and a stopwatch were employed, and the collected data was analyzed using a paired t-test or Wilcoxon signed-rank test.

Measure tape for lateral lunge

PROCEDURE

IRB Approval was taken

⇩

Selection of participants was done according to inclusion and exclusion criteria written consent was obtained

⇩

Measurement of participant's range of lateral lunge was done using tape measurement Administered Edgren side step test to assess agility

⇩

Foam rolling was given bilaterally to adductors and Tensor fascia lata (90 sec each muscle)

+

Re--Measured the length of lateral lunge immediately post foam rolling using tape measurement

⇩

Administered Edgren side step test to test agility immediately post foam rolling compared the findings

⇩

Statistical analysis of data using paired T test was done

PICTURES

Fig A: Foam rolling for Tensor Fascia Lata

Fig B: Foam rolling for adductors

Fig C: Foam rolling for Abductors

OUTCOME MEASURE

Edgren Side Step Test

Test setup:

Five vertical tape lines are placed three feet apart on a 12-foot-long course (12 feet total between the two outside tape pieces).

Procedure:

The starting position is at the centre tape, facing forward with feet straddling the centre line. At the command 'go', the participant sidesteps to the right until their right foot touches or crosses the next tape mark on the right side. Continue until the end of RHS. The participant then sidesteps to the left (mimic the same on the left side). The participant sidesteps back and forth as rapidly as possible for 10 seconds.

Scoring: Count the number of lines crossed. Deduct a point if:

1. The far end lines are not reached

2. If they fail to keep their trunk and feet pointed forward at all times or crosses the legs. The best results of three trails should be recorded. Validity: p=0.10 Reliability: r=0.92

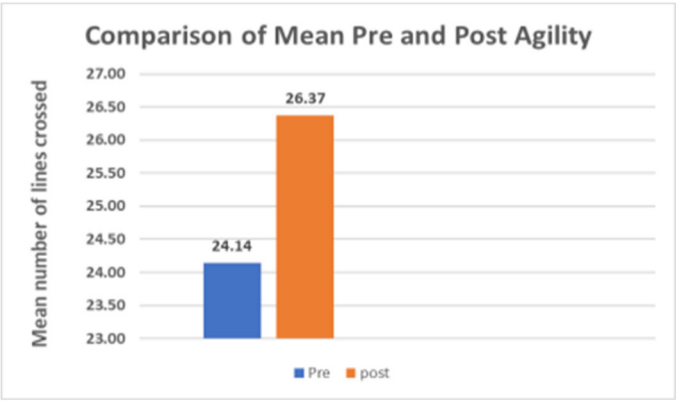
Side lunge using tape measurement:
Distance will be measured (in cms) from the start line to the medial most aspect of lead foot in cm

STATISTICAL ANALYSIS

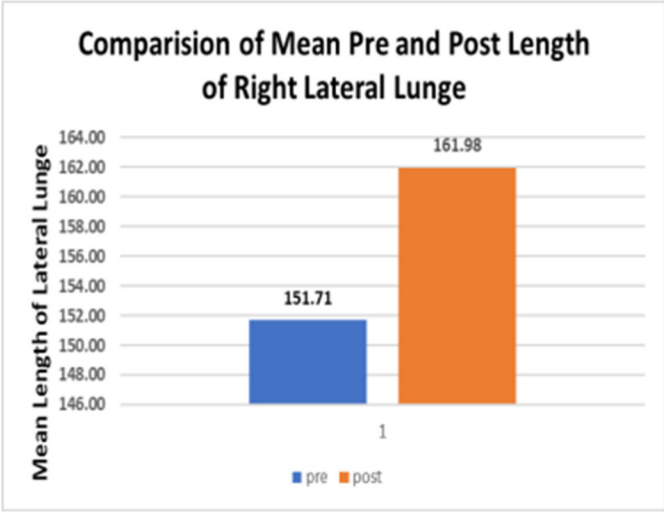
Data was put into master chart on Microsoft excel. Shapiro wilk test was used and data passed normality. **P**aired T test showed that data was highly significant P<0.001

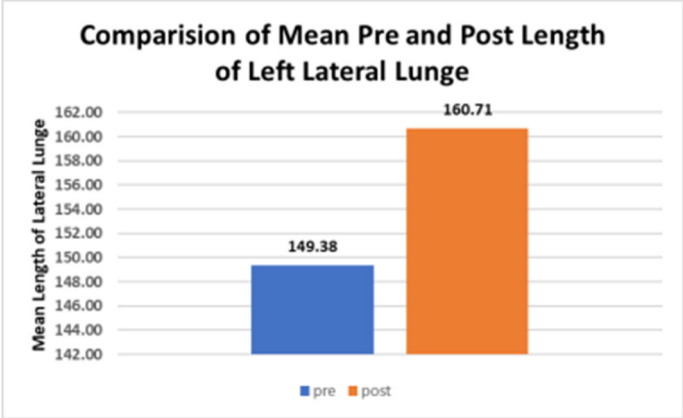
RESULTS:

The number of lines crossed increased from 24 to 26. Showing a 6 feet difference in agility. Following were the results of length of lateral lunge measurement pre and post foam rolling:



- Right lateral lunge increased by **10.27cms** post foam rolling
- Left lateral lunge increased by **11.33 cms** post foam rolling





DISCUSSION

Table tennis is a globally popular sport enjoyed both recreationally and competitively. Players stand at opposite ends of a table, using small wooden bats to hit a plastic ball over a low-lying net. One of the key strategies to score points is to direct shots to the contralateral side of the table at which the opponent is standing. This requires swift lunges and quick movements to be performed by him to reach the other side of the table to return the ball. Thus, the ability to execute a lateral lunge effectively, along with adequate agility to change position quickly, plays a vital role in winning table tennis matches.

To investigate whether foam rolling could enhance these crucial skills in male recreational table tennis players, this study was conducted with twenty male recreational table tennis players as participants, with mean age of 22.15 years. The study's inclusion criteria were defined with meticulous consideration to ensure the integrity of the participant pool. Firstly, the participants were required to be 'recreational' table tennis players, engaging in the sport for a minimum of one hour per session, on three to five days per week. This criterion aimed to capture individuals with a consistent level of involvement in table tennis, thus reflecting the typical recreational player demographic. Additionally, the study specifically focused on male players, excluding female participants. This decision was motivated by the potential influence of ovulation on ligament laxity in females, which could introduce confounding variables and lead to false positives. By exclusively enrolling male players, the study sought to mitigate these potential discrepancies and maintain the homogeneity of the participant group. Individuals with the following conditions were excluded from participation: musculoskeletal pain in the lower limb, fractures of the lower limb, soft tissue injuries of lower limb and any neurological conditions of lower limb. Overall, these inclusion and exclusion criteria were thoughtfully crafted to ensure a standardized participant pool, thereby enhancing the reliability and validity of the study's findings.

Each participant's length of lateral lunge was taken using tape measurement and agility was tested using Edgren Side Step test after this foam rolling was self-administered by each player for 90 seconds on (bilateral) abductors and adductors muscle group. Following foam rolling the length of lateral lunge and agility was tested using the same procedure. The Results revealed 10cm average increase in length of lateral lunge post foam rolling and 6 feet increase in agility.

These results can be attributed to physiological changes induced by foam rolling which are as follows: when the pressure of the foam roller is applied on the muscle it causes stimulation of the mechanoreceptors of fascia causing the "Golgi tendon organ" and "muscle spindle" to turn off, allowing muscle fibres to relax and stretch. Thereby, resulting in increased flexibility. The pressure also causes compression of arterial blood flow followed by an immediate release causing a gush of blood to flow to the area being treated. This influx of blood causes washout of metabolites and may potentially reduce fatigue and improve performance. The statistical significance of these findings, with a p-value of less than 0.001, falls under the highly significant category, proving that the results have a high chance of being replicated in other individuals as well.

Given its cost-effectiveness, simplicity, and accessibility, incorporating foam rolling into warm-up routines before matches can offer recreational players a practical means to enhance their performance. Notably, this technique requires no supervision and can be easily adopted by players without prior professional coaching or physiotherapy experience. Several other studies corroborate the effectiveness of foam rolling not just for athletic performance: For instance, a study focusing on badminton players demonstrated a significant increase in vertical height ($p < 0.001$) after foam rolling targeted at the quadriceps and hamstrings. Another study found that combining jogging with foam rolling led to superior improvements in ankle dorsiflexion and counter movement jump compared to jogging alone. Moreover, a separate study involving elite table tennis players showed that incorporating dynamic stretching alongside foam rolling resulted in enhanced flexibility, power, ball speed, and agility. These findings align with the outcomes of the current study, further supporting the notion that foam rolling can effectively optimize athletic performance.

By accumulating evidence from various studies, these studies underscore the versatility and efficacy of foam rolling as a pre-match intervention. Integrating foam rolling into warm-up routines can serve as a valuable strategy for athletes seeking to enhance their physical capabilities and maximize their competitive edge on the field or court.

CONCLUSION

After conducting the study and analysing the statistical data, the results revealed significant improvements in both the right and left lateral lunge lengths, with average increases of 10.27 cm and 11.33 cm, respectively. Additionally, there was a notable average increase of 6 feet in agility following foam rolling. These findings strongly suggest that incorporating foam rolling into the warm-up protocol of table tennis players can provide them with a competitive edge in matches. By enhancing lateral lunge lengths on both sides and improving overall agility, foam rolling can help player's better reach and respond to shots directed to the opposite side of the table. This increased range of motion and agility can significantly improve players' ability to manoeuvre on the table and effectively return shots, ultimately enhancing their performance during matches. Therefore, based on the study results, it is recommended that foam rolling be integrated into the warm up routines of table tennis players to optimize their physical readiness and potentially improve their chances of success in competitive play.

CLINICAL IMPLICATIONS

Improved Performance: Integrating foam rolling into the warm-up protocol can enhance players' physical capabilities, such as range of motion and agility, potentially leading to improved performance on the table. Cost-Effective Solution: Foam rolling is a budget-friendly option that can be easily incorporated into training routines without need for other special equipment. Self-Administered: Recreational players can perform foam rolling themselves without the need for supervision or prior experience with physiotherapy. This makes it accessible to recreational players since most haven't undergone formal coaching.

LIMITATIONS

A small sample size and only medium density foam roller was used.

FUTURE SCOPE

Inclusion of female participants. Inclusion of professional players. To study delayed effect of foam rolling on length of lateral lunge and agility.

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