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Abstract

Background: Badminton is a sport in which players use a combination of speed, endurance, strength, and coordination over lengthy, high-intensity actions that are broken up by rest breaks. In sports, a warm-up is a pre-exercise session intended to improve performance in competition or training. Training that has been introduced into training programmes involves properly warming up the body before physical exercise. General warm up doesn’t help on injury prevention in all games, so there is a need for sports specific warm up programs to promote more flexibility and readiness before the specific strength training and power training.

Purpose: To assess the impact of a sports-specific warm-up procedure on badminton players’ ability to avoid injuries.

Materials and Method: From the SDAT in Chennai, a total of 100 young badminton players were chosen. With a mean age of 22.35 ± 3.23, there were 59 male and 41 female players among them. Injury Rate, Epidemiological Incidence Proportion and Incidence Rate were used as outcome measures. The players were split into two groups, one of which received a sports-specific warm-up procedure and the other of which received a generic warm-up regimen.

Results: By the descriptive statistics of the collected data, the Sports Specific Warm-up group showed better improvement in preventing injuries compared to the conventional group.

Conclusion: It has been concluded that Sports Specific Warm-up plays a vital role in preventing on-field injuries among badminton players.

Key Word: Warm-up, incidence rate, exercise training, performance, athletes.

Introduction

In India, badminton is a well-liked sport for both competition and recreation. Indian players now have more players than any other country in the top thirty ranks for men’s singles, and they have held the top spot for both men’s and women’s singles in the Badminton World Federation (BWF) ranking. It is thought to be the fastest racquet sport because of how quickly it moves¹. A rectangular indoor or outdoor court is used for the physical game of badminton, which can be played for fun or at a high level of competition. All ages can maintain
their fitness levels by playing badminton. There has been a significant growth in the number of female athletes over the past 30 years. Badminton is a sport that involves extended, high-intensity motions (that need speed, endurance, strength, and coordination) interspersed with rest periods. After a century of active development, badminton is currently seeing a tremendous rise in popularity. It is currently one of the most well-liked sports in the globe. Sudden, rapid direction changes and brief bursts of movement are also required in badminton, as well as diving to retrieve the shuttlecock. This puts players at risk for severe non-contact injuries to their joints and muscle-tendon units. Racquet collisions or collisions between doubles players can result in contact injuries such as concussions and eye damage. In order to succeed as a top badminton player, it is essential to avoid injuries and cut down on recovery time.

There are four steps involved in injury prevention in any sport: injury surveillance to assess the problem’s breadth, aetiology and mechanism identification, adoption of preventive measures, and evaluation of those measures’ efficacy. In the non-contact individual sport of badminton, players must hop, lunge, change directions quickly, and swing their arms quickly from a variety of body postures. Common overuse injuries include those to the back, shoulders, lower legs, and knees. Acute limb injuries are likely to happen frequently in badminton because of the sport’s extreme physical demands. Sports injuries in general are thought to make up 1% to 5% of badminton injuries, with male players hurting themselves more frequently than female players. Across all age groups, female players had higher injury rates (IR) than male players, which rose dramatically with age. The growth in mechanical stress during matches with increasing competitiveness may be the cause of age-related increases in IR. Lower limbs tend to sustain muscle injuries more frequently than other parts of the body. Sprains were the most prevalent ailment detected (56%), followed by fractures (5%), torn ankle ligaments (10%), and (13%) Achilles tendon ruptures. Players in badminton must quickly adjust their body position in response to the moving shuttlecock. Aerobic endurance, agility, strength, speed, and precision are all required of players. It is a technical activity that calls for extraordinary motor control and mastery of difficult racquet movements.

An enormous amount of stress is placed on the upper extremity by repetitive overhead forehand and backhand strokes, deception, and a very short striking technique.

Warming up is a term used in sports to describe a time of preparation before engaging in physical activity in order to improve performance in competition or training. Warming up properly prepares the body for more intensive activities, as well as preventing injuries and improving blood flow to the muscles. Stretching exercises improve player performance or flexibility by extending the range of motion of joints and maintaining flexibility. Warming up will stop muscle soreness from happening, which will increase player performance, raise muscle temperature, and reduce the risk of injury. Increased anaerobic performance and improved range of motion are two benefits of warming up; yet, weak or unreliable ROM for a particular joint may result from a lack of warm-up effort. In order to improve performance and reduce injuries, warm up before exercising. The length, intensity, and attitude of the warm-up are all closely related to its benefits. Exercise-specific warm-ups increased body temperature, heart rate, and anaerobic threshold while reducing range of motion in the knee and hip joints. There are numerous advantages to warming up before exercising with the goal of enhancing performance and preventing injuries, and these advantages are closely associated with the time, intensity, and state of the warm-up. Warming up helps to avoid muscular soreness, improves player performance, raises muscle temperature, and reduces the risk of injury. To improve performance and prevent injuries, warming up before exercise has a number of benefits, and these benefits are directly related to the length, rigor, and state of the warm-up. Upper and lower extremities together Warming up has the potential to improve performance and prevent injuries, but no studies have been done to see if and how this happens in the upper extremity.

Aim

To assess the impact of a sports-specific warmup strategy on badminton players’ ability to avoid injuries.
Materials and Method

From SDAT, Chennai, a total of 100 young badminton players were chosen. This experimental study was conducted from the month of August to November 2022. With a mean age of 22.35 ± 3.23, there were 59 male players and 41 female players.

Inclusion criteria:

- Both genders aged between 18 and 25 years.
- Badminton players who are continuously into the game for more than 2 years.

Exclusion criteria:

- Badminton players who have been injured recently.
- Players who are in the off-season.

Outcome measure:

- Sports Injury Reporting Form\textsuperscript{14}.
- Epidemiologic Incidence Proportion (IP)\textsuperscript{14}.
- Incidence Rate (IR)\textsuperscript{14}.

Procedure

The selected players were clearly explained about the protocols and informed consent was obtained. The participants were divided according to their experience and age. Then they were split into two groups at random, designated as the Specific Warm-up Group (SWG) and the Conventional Warm-up Group (CWG). Baseline measures of Injury Rate, Epidemiological Incidence Proportion and Incidence Rate were calculated. Specific Warm-up Group (SWG) received the experimental protocol of Sports Specific warm-up for 30 minutes before the game. Conventional Warm-up Group (CWG) received the regular Generic warm-up protocols with short runs, active dynamic stretches, push-ups and aerobic exercises for 30 minutes. The duration of this study was for 6 weeks.

Sports Specific warm up protocol:

1. Calf Jumps: Standing with back straight, core tight and hands over the sides. Forcefully press off the ground with the balls of both the feet. \textit{Repetitions:} 15 times* 3 sets/ sessions for 6 weeks.

2. Vertical Jumps: The act of jumping upwards into the air. It is the standard test for measuring athletic performances. \textit{Repetitions:} 15 times* 3 sets/ sessions for 6 weeks.

3. Drills: Plain and basic, drill is marching. You “March” and put your left foot in front of and parallel to your right foot by taking a 12-inch step. Lie on both of your feet’s balls to evenly distribute your weight. \textit{Repetitions:} 15 times* 3 sets/ sessions for 6 weeks.

4. T-Run: T-Run involves forward, lateral and backward movement running over the given T mark. \textit{Repetitions:} 5 times/ session for 6 weeks.

5. Side Squats: Start by standing with broader feet than hips, the knees and toes pointed forward. Shift weight into the right heel, push the hip back and bend the knee while leaving the left leg straight. Then, drive through your right foot to reverse the movement. \textit{Repetitions:} 15 times* 3 sets/ sessions for 6 weeks.

6. Burpees: Beginning with your straight spine, knees bent, and feet with shoulders wide apart, squat down. Lower hands to floor in front, so they’re just inside feet. With weight on hands, kick feet back so on hands and toes and in push-up position. They stand and reach their arms over their heads. Jump quickly into the air and land back. \textit{Repetitions:} 12 times* 2 sets/ sessions for 6 weeks.

7. Side Lunges: To begin, place your feet shoulder-width apart while pointing your toes forward. Step out with your right foot as wide as possible. Engage through the right heel as you drop hips down and back while keeping the left leg straight, stretching the groin on the left leg and keeping both soles of the feet on the ground. \textit{Repetitions:} 15 times* 3 sets/ sessions for 6 weeks.

8. Inch Worm: Standing erect with your feet shoulder-width apart, stoop down and touch the floor with the palm of your hands, walk hands out as far as while keeping your legs straight and pause. Walk back up to the starting position and repeat until the set is complete. \textit{Repetitions:} 12 times* 3 sets/ sessions for 6 weeks.

9. Walking Lunges with trunk twist: Right foot forward, body lowered into a basic lunge position. Twist upper body to the right from midsection. Keep core engaged,
squeeze glutes, and be careful to not rotate your knee. Bring arms back to the centre in a slow, controlled movement. Step the right foot back and return to the starting position. *Repetitions*: 5 rounds/session for 6 weeks.

10. **Multi Directional Lunges**: Front lunge step forward and back knee should just touch the ground. Front 45 degrees angle lunge step with head and eyes facing forward and pelvis and shoulders square to the front allow the back leg to pivot as the lunge. Lateral lunge steps out to the side as per previous exercise. Back 45 degrees lunge step back and lower the back knee until it touches the ground, back lunge step backwards. *Repetitions*: 10 times* 3 sets/session for 6 weeks.

11. **Squat Jumps**: Standing with your feet shoulder width apart and your knees slightly bent, lower yourself into a full squat. Lift the body off the ground by kicking out the hip and knee. The feet will be a few inches off the ground when the legs are fully extended. To manage the landing, lower yourself, squat, and then lower yourself again for another powerful jump. *Repetitions*: 12 times* 3 sets/session for 6 weeks.

**Data Analysis**

Participants in this study came from a total of 100 badminton players. Injury rate, epidemiological incidence proportion and incidence rate variables had been estimated and tabulated post-intervention. The data that had been gathered was examined using descriptive statistics.

**Result**

Incidence of injuries in both previous in-season and post interventional in-season were evaluated and presented in Table-1. Total of 35(70%) out of 50 subjects in SWG were injured in the previous in-season (before intervention) and 19(38%) out of 50 subjects were injured in present in-season (after intervention). Whereas 39(78%) out of 50 subjects in CWG were injured in previous in-season (before intervention) and 26(56%) were injured in present in-season (after intervention). Incidence rate (IR) was 4.5 per 1000 athlete’s exposure in previous in-season (before intervention) whereas 3.9 per 1000 athlete’s exposure in present in-season (after intervention). Epidemiological Incidence Proportion (IP) of SWG was 0.29 whereas in control group it was of 0.54.

**Table 1: Number of players injured.**

<table>
<thead>
<tr>
<th>S No</th>
<th>Type of injury</th>
<th>SWG</th>
<th>CWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dislocation</td>
<td>3(6%)</td>
<td>4(8%)</td>
</tr>
<tr>
<td>2.</td>
<td>Skin injuries</td>
<td>6(12%)</td>
<td>8(16%)</td>
</tr>
<tr>
<td>3.</td>
<td>Overuse injury</td>
<td>5(10%)</td>
<td>2(4%)</td>
</tr>
<tr>
<td>4.</td>
<td>Respiratory problem</td>
<td>3(6%)</td>
<td>3(6%)</td>
</tr>
<tr>
<td>5.</td>
<td>Sprain</td>
<td>8(16%)</td>
<td>10(20%)</td>
</tr>
<tr>
<td>6.</td>
<td>Strain</td>
<td>10(20%)</td>
<td>12(24%)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>35(70%)</strong></td>
<td><strong>39(78%)</strong></td>
</tr>
</tbody>
</table>
The current study’s goal was to find out how badminton players’ performance was impacted by sports warming up routines. Exercises during the warm-up phase raise body temperature and heart rate, boost productivity, and lower injury risk. The results of past studies that examined how warm-up exercises affected player performance provide evidence in favour of this theory.

A study conducted by Yuksel et.al (2015), stated that the elite and junior level badminton players’ strength and endurance can be improved by performing warm-up exercises that combine both of these elements. To enhance the fitness indices of badminton players, numerous training regimens with various warm-up exercises have been created.

In a study Yadav JS et.al (2017), concluded how specific exercises affected a player’s flexibility and coordination in badminton and tennis. The results supported the current study’s conclusions, which show that warm-up exercises greatly increase joint flexibility and coordination.

Samson et.al (2012), determines how performance is affected by dynamic and static warm-up exercises. Dynamic warm-up techniques result in the highest levels of overall performance when compared to static warm-up protocols. The findings of this study, which demonstrate that dynamic warm-up exercises had the highest overall impact on badminton players’ performance, are supported by earlier research.

Any physical exercise should be preceded by a warm-up to prepare the body and mind for more demanding activities. It raises the body’s internal temperature while also raising the temperature of the muscles. Muscles become supple and elastic as their temperature rises. A brief physical activity should be the main component of the overall warm up. Exercises like jogging, easy swimming, riding a stationary bike, skipping, or light aerobics. Sports specific warm-up is a phase of the warm-up when the athlete precisely gets the body ready for the demands of his or her particular sport. This phase of the warm-up involves more strenuous activities. The exercises should mimic the kinds of actions and movements that would be needed during the sporting event. Warm-up activities enhance player’s coordination, strength, flexibility, and endurance while also having a positive impact on their performance in badminton. The health of players is improved by warm up exercises. Sports and physical activity help athletes build confidence and mentally prepare for competition.

A player’s physical health plays a crucial role in their ability to perform well in sports. Despite being a non-contact sport, badminton nevertheless carries a sizable risk of injury. The current study’s conclusion elaborates that, when compared to a conventional warm-up, a sports-specific warm-up has greater outcome in reducing injuries among badminton players.
players. In a sports-specific warm-up routine, we prefer to place greater emphasis on warm-up exercises that will enhance the performance of badminton players as well as exercises that will assist increase coordination, strength, flexibility, endurance, and sports activities.

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**Conflict of Interest:** No conflict of interest during this research.

**References**