Comparison of Physiological Profiles among Collegiate Football Players with and Without Musculoskeletal Pain: A Case Controlled Study

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Abstract

Background: The physiological data cannot be the only predictor of competitive performance, much like in other sports where abilities are crucial. On the other hand, it’s important to remember that these physiological norms and standards are prerequisites for success in football competition at the highest levels. When choosing talent, conventions are crucial. For athletes who train and compete at the greatest levels of performance, pain management is a critical concern.

Purpose: To evaluate the comparison of physiological effects among collegiate-level football players with and without musculoskeletal pain.

Materials and Methods: The subjects were selected from the Saveetha physical education department based on inclusion criteria from January 2022 to April 2022. They explained about the study. 25 collegiate football players were involved: group A (n = 7) with musculoskeletal pain and group B (n = 17) without musculoskeletal pain. The pro agility shuttle, vertical jump, standing broad jump, 40-yard test, and three cone drill were assessed, and the body composition was assessed using a skinfold caliper.

Result: The statistical analysis made with quantitative data revealed no statistical difference between groups A and B.

Conclusion: The present study shows there is no significant difference in the physiological profiles of football players with or without musculoskeletal pain.

Key words: Football players, Physiological profiles, Anthropometric measurements.

Introduction

The physiological data cannot be the only predictor of competitive performance, much like in other sports where abilities are crucial. On the other hand, it’s important to remember that these physiological norms and standards are prerequisites for success in football competition at the highest levels. Despite the increasing interest in training and competitive environments, sports injuries are quite common. About one-third of adults suffer from chronic musculoskeletal pain, which is a serious public health issue. A simple biological approach might not be sufficient because pain is frequently...
present in the musculoskeletal system without any obvious results.\(^1\) A biopsychosocial approach might provide novel therapeutic goals and a better understanding of symptoms. For preventive and early intervention, it is crucial to identify chronic risk factors. 20% of visits to primary care doctors and 80% of visits to sports medicine clinics are for musculoskeletal issues.\(^2\) The chronic musculoskeletal pain often found were fibromyalgia, overtraining syndrome, and reflex sympathetic dystrophy. Primary care visits are frequently prompted by musculoskeletal complaints of various kinds, such as neck pain, limb pain, low back pain, joint pain, and persistent generalized pain.\(^2\) The management guidelines provided also apply to generalized non-specific musculoskeletal problems. Pain complaints in football-related dangers prior to becoming chronic, pain concerns are often self-limiting, but they might have major repercussions. These include the distress of patients and their families and consequences for employers in terms of sickness.\(^3\) Reasons discovered include level of competition, season, playing surface, player position, playing experience, and prior injuries. Unfortunately, only a few of these factors can be changed to reduce the chance of damage. Body mass index (BMI), strength, and flexibility are some modifiable characteristics that have historically been linked to injury risk in football.\(^4\) Strength by itself does not appear to be associated with an increased risk of injury among football players, according to prior study BMI results are equivocal. Functional testing techniques that look at many body-related movement domains have recently been able to identify professional football players who are more susceptible to injury. Looking at tests that need a greater level of dynamic balance, including single-limb balance at the stability.\(^4\) Professional football players who are more prone to injury have lately been identified using functional testing approaches that examine numerous body-related movement domains. Considering tests that need a greater degree of dynamic balance.\(^5\) One of the most popular sports in the world is football, and that popularity is only growing. Regarding its physiological requirements, there is still a great deal of confusion and disagreement. Football is a challenging sport to analyse scientifically because of the coaching emphasis on skill development, deficits in fitness training, and conservative training approaches.\(^6\) The average amount of movement each player makes in a single game is over 10 kilometres.\(^7\) Considering the injuries in football sports from the literature, the present study is focused on the physiological effects among collegiate-level football players with and without musculoskeletal pain.

**Aim**

To find the difference in physiological profile between players with and without musculoskeletal pain among collegiate-level football players.

**Material and Method**

The subjects were selected from the Saveetha physical education department based on inclusion criteria from January 2022 to April 2022. They explained about the study. 25 collegiate football players were involved: group A (n = 7) with musculoskeletal pain and group B (n = 17) without musculoskeletal pain. The participant’s musculoskeletal pain was recorded using the Modified Nordic musculoskeletal Questionnaire to understand their pain level for the past 7 days and 12 months. The pro agility shuttle, vertical jump, standing broad jump, 40-yard test, and three cone drill were assessed, and the body composition was assessed using a skinfold caliper. Collegiate football players under the age level (18-24), With and without musculoskeletal pain were included. Players with recent surgery and players with fractures were excluded.

**Procedure**

The data were gathered at the Saveetha College of Physical Education Department. The tests include a 40-yard sprint, height and body mass measurements, a vertical leap, a standing broad jump, a pro-agility shuttle, and a three-cone drill. These tests were chosen because they are frequently employed in the evaluation of football players. The standing broad jump, 40-yard sprint, and vertical leap were all tested on the field. The pro-agility shuttle and three-cone drill were conducted on a patch of unmanicured grass in the ground.

**Vertical Jump:**

Performance in vertical jumps was gathered using Vertec equipment (Yardstick, Swift Performance).
Standing side-on to the Vertec at first (on the subject's dominant side), the subject fully elevated their shoulder to displace as many vanes as they could while keeping their heels on the ground. As the zero reference, the final vane movement. Height was measured from the highest vane moved after the individual leaped as high as they could without taking any preceding steps. The knee angle attained during the eccentric part of the jump was unrestricted. The standing reach height was subtracted from the leap height to determine the vertical jump height. The best trial from each subject’s two trials was utilised for the analysis of power.

Pro Agility Shuttle:

The pro-agility shuttle course is depicted. Prior to the test, subjects were permitted to have a practice run used as a single timing gate. Between the timing gates, subjects assumed a three-point stance while straddling the middle line. The patient was stabilised in the laser beam before starting, and this technique was known as an “in-beam start.” To begin the test, the individual ran five yards (4.57 m) to one side before turning and touching the line with one hand. The individual then made a U-turn, ran 10 yards (9.14 m) to the opposite side, touched the opposite line, and then returned via the starting/finish line. The pro-agility shuttle has researchers stationed at either end to make sure the individuals touch the line.

Standing Broad Jump:

The standing broad jump involved the athlete placing the toes of both feet on the back of the starting line. With a simultaneous arm swing and crouch, the subject then leaped forward as far as possible, ensuring a two-footed landing. Subjects had to stick to the landing for the trial to be counted. The distance was measured using a standard tape measure from the front of the start line to the back of the back heel at the landing for the trial to be counted. If the subject did not do this, the trial was disregarded and another trial was completed. No restrictions were placed on body angles attained during the preparatory phase of the jump. Each subject completed two trials, and the best trial was used.

Three Cone Drill Test:

The subjects were made to practice before test, The subjects starts in three point position at marker 1, 30cm back from the starting line at the instructions participants sprinted to marker 2, bent down and place their hand(right) on the floor then they hurried back to marker 1, and repeated the procedure the participants then returned to marker 2, circled it again and ran through marker 3 around marker 2 and ended the procedure, the subjects jogged in front of the test changing directions at each marker they completed correctly, the participants opened the entryway for the first time and time was recorded from that point until subjects closed the gate once more at conclusion of the test, two trials were completed in first trial subjects turned to left.

Data Analysis

A statistical analysis was done to note and evaluate the physiological profile with and without musculoskeletal pain among collegiate football players. The selected variables were assessed using Mann-Whitney U test. The mean and standard deviation were calculated.

Results

The 25 collegiate foot players were recruited in a specific age group (18–24) with a BMI (mean 21.61; SD 4.87). The participant’s body composition variables do not show any significant difference between musculoskeletal pain and no pain, as shown in Table 1. Whereas the participant’s pro agility test showed a significant difference between musculoskeletal pain and no-pain football players, as shown in Table 2.

<table>
<thead>
<tr>
<th>Table 1: Body Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Without Musculoskeletal Pain (N=18)</strong></td>
</tr>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>triceps</td>
</tr>
<tr>
<td>midaxillary</td>
</tr>
<tr>
<td>chest</td>
</tr>
<tr>
<td>Subscapular</td>
</tr>
<tr>
<td>abdomen</td>
</tr>
<tr>
<td>Iliac crest</td>
</tr>
<tr>
<td>Thigh</td>
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<tr>
<td>calf</td>
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</tbody>
</table>
Table 2: Agility Tests

<table>
<thead>
<tr>
<th>Variables</th>
<th>Without musculoskeletal pain</th>
<th>With musculoskeletal pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>40 yards sprint</td>
<td>37.3244</td>
<td>133.43816</td>
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<tr>
<td>Pro agility shuttle</td>
<td>4.3328</td>
<td>2.5111</td>
</tr>
<tr>
<td>Vertical jump</td>
<td>2.5111</td>
<td>1.19369</td>
</tr>
<tr>
<td>Standing broad jump</td>
<td>2.5417</td>
<td>1.20712</td>
</tr>
<tr>
<td>Three cone drill</td>
<td>8.9894</td>
<td>1.60377</td>
</tr>
</tbody>
</table>

Discussion

This study compared the physiological profiles of collegiate-level football players with and without musculoskeletal pain; physiological profiles were observed (skinfold caliper for measuring body composition of subjects). Using a calibrated scale, body mass was measured to the nearest 0.1 kg. Both measurements were performed without shoes. The body mass index was determined by dividing the body weight in kilograms by the square of the height in meters. On the right side of the body, double-thickness subcutaneous adipose tissue was measured using skin fold calipers Triceps, pectoralis, subscapular, abdominal, midaxillary, suprailliac, and thigh anatomical locations were all measured. Some tests were kept for the subjects like 40-yard sprint, vertical jump, pro-agility, standing board jump, and three cone drill. The subjects were not fair in performance tests; there were significant differences in subjects BMI, heights, and body composition measured, and tests were seen between subjects with and without pain. The pro-agility shuttle and three cone drill tests showed greater impact, while other tests did not show more impact. Compared to these tests, the three cone drill and pro-agility showed the pain tolerance in performing the tests, whereas subjects with musculoskeletal conditions did not have the same tolerance level to these tests the three cone drill and pro agility shows the pain tolerance in performing the tests, whereas subjects having musculoskeletal pain did not have same tolerance level to perform. However, the participants in the present study do not have any difference in the body composition between the football players with pain and no pain. In 2017, Maren Hjel et al. observed that participation in endurance sports may be especially advantageous and that a moderate physical activity level was associated with fewer neck and shoulder pains and lower back pain. The findings showed that while assessing teenagers’ musculoskeletal discomfort, medical providers must take into account the types of sports they engage in. Muhammad Hasnain Murtaza et al., reported that the most common musculoskeletal disorders in football strikers were shoulder (56.5%), neck (55.1%), and ankles (53.6%), whereas the most common musculoskeletal disorders in defenders were ankles (68.7%), knees (57.8%), and hips and thighs (54.2%). In 2019, Ross Zafonte et al. conducted a study on football players at Harvard University. The study’s design and objectives led them to conclude that an extensive and ambitious research and translation programme at Harvard University aims to safely collect data on the everyday facet of life of former ASF players. While some parameters are fully recovered (e.g., hormonal and technical), our systematic review shows that a period of 72 hours post-match play is not long enough to completely restore homeostatic balance (e.g., muscle damage and physical and well-being status). This study aimed to provide a physiological profile of the top soccer player. Protocols were created to measure muscle strength, flexibility, body composition, anaerobic power, and lower extremity functional performance. Chin MK, Lo YS, Li CT, Western Europe, and North America produce the majority of elite soccer players with certain physiological profiles. Since this present study addresses only the collegiate level football players, the result obtained in the present study may not be generalizable to the football players in other levels.

Conclusion

Findings indicate that a football player’s musculoskeletal pain does not affect their
physiological profile. However, the study’s results are limited due to the small number of participants. The author recommends future studies be carried out in elite athletes and other sports to understand the relationship between the physiological profile and pain discomfort.

**Ethical clearance:** Taken from institutional Ethical committee. ISRB number-03/031/2022/ISRB/SR/SCPT.

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**Conflict of Interest:** The authors state that there is no conflict of interest

**References**