

Prevalance of Brachioradialis Pain in Recreational Badminton Players

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ABSTRACT

Background: Badminton is a high-speed racquet sport involving repetitive upper limb activity, making recreational players prone to forearm muscle overuse injuries, especially brachioradialis pain. Despite its functional importance, limited research focuses on brachioradialis involvement in badminton-related forearm pain.

Objectives: To determine the prevalence and characteristics of brachioradialis pain among recreational badminton players.

Methods: A cross-sectional observational study was conducted on 201 recreational badminton players aged 18–25 years at Krishna College of Physiotherapy, Karad. Participants were selected using simple random sampling. Data were collected through a validated questionnaire, Manual Muscle Testing (MMT), and Numerical Pain Rating Scale (NPRS). Statistical analysis included frequency distribution and chi-square tests.

Results: Of the 201 participants, 70.6% were female and 29.4% male. Right-sided dominance was observed in 83.6% of players. A total of 86.6% reported outer forearm pain, most frequently described as dull or aching (62%). Pain was predominantly mild to moderate, with delayed onset occurring 2–3 hours post-play in 44.3% of cases. Right limb MMT grades 4 and 5 showed significant weakness compared to the left ($p < 0.0001$). Only 54.2% performed warm-up and 35.8% did cool-down exercises.

Conclusion: The study revealed a high prevalence of brachioradialis pain among recreational badminton players, particularly on the dominant limb. Improper warm-up and cool-down routines, lack of stretching, and poor playing technique were major contributing factors. Awareness and preventive strategies emphasizing biomechanics and conditioning are recommended.

Keywords: Brachioradialis pain, Recreational badminton, Forearm pain, Overuse injury, Prevalence

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INTRODUCTION

Badminton is a globally popular racket sport that requires a combination of agility, coordination, power, and endurance. The repetitive and high-velocity movements involved in overhead strokes, smashes, and rapid changes in direction place significant biomechanical stress on the upper limb joints, particularly the shoulder, elbow, and wrist.^{1,2}

These repetitive actions often lead to overuse injuries and musculoskeletal pain among both professional and recreational players.³ Upper limb pain in badminton

players commonly manifests as shoulder impingement, lateral epicondylitis, wrist tendinopathies, and muscle strain due to the high demands of stroke production and gripping techniques.⁴

The shoulder joint, being highly mobile yet inherently unstable, is particularly susceptible to injury during repetitive overhead movements such as smashes and clears.^{1,4} Similarly, the elbow and wrist joints are vulnerable to excessive strain from forceful gripping, forearm pronation-supination, and rapid acceleration-deceleration actions inherent in the sport.^{3,7}

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Biomechanical studies have emphasized that improper stroke mechanics, poor posture, and inadequate warm-up or flexibility training can further increase the risk of injury.^{5,6} The technique and sequence of arm and wrist motion during badminton strokes have been analyzed using motion analysis systems, revealing the complexity of upper limb coordination and muscle recruitment, especially in the brachioradialis and forearm muscles.^{6,7,8}

The brachioradialis, in particular, plays a vital role in forearm stabilization during gripping and racket control, making it a critical structure in understanding forearm pain patterns among players.⁸ Moreover, preventive strategies focusing on correct technique, strengthening, and flexibility exercises are crucial for minimizing the risk of upper limb pain and enhancing performance.^{5,9}

A detailed understanding of the prevalence and contributing factors of shoulder, elbow, and wrist pain in recreational badminton players can therefore guide physiotherapists in designing targeted intervention and training programs to promote musculoskeletal health and performance longevity.

MATERIALS AND METHODS

This was a observational cross-sectional study that included 201 participants who had a history of a Brachioradialis pain. The study was approved by the Ethical Committee and Protocol Committee. 201 participants were chosen using the formula of $n = 4pq/L^2$, where p was considered as 56, q was $100-56 = 44$, and L was taken as 7. Thus, the sample was 201. The sampling method used was simple random sampling

$$4 * 56 * 44 = 201 \text{ participants}$$

49

The inclusion criteria were to include both male and female playing badminton recreationally, their age criteria was set between 18-25. People above the age group 25 and below 18 were excluded, people playing badminton professionally and people playing any other sport professionally were excluded. Also, people with previous injury of elbow, shoulder or wrist were excluded.

Data from 201 participants were collected using a structured Data collection sheet which included Biomechanical measures and a self-made Questionnaire.

The Biomechanical evaluations included MMT (Manual Muscle Testing) of brachioradialis muscle and NPRS (Numerical Pain Rating Scale) to understand the amount of pain participant has.

A female aged 21yrs (playing badminton recreationally) indicated of having Brachioradialis pain after a game of badminton. The pain she experience was 5/10 according to NPRS rating scale and she had GRADE 4 MMT of Brachioradialis muscle as shown in the figure below.



RESULTS:

Table no 1: Demographic data

	FREQUENCY	PERCENTAGE
MALE	59	29.36%
FEMALE	142	70.65%
TOTAL	201	

Interpretation:

The gender distribution in the present study shows that out of 201 individuals, 142 (70.65%) were female and 59 (29.36%) were male.

This shows a clear female predominance in the sample, with females making up more than twice the proportion of males.

Table no 2: Handedness of participant

	FREQUENCY	PERCENTAGE
RIGHT-HANDED	168	83.58
LEFT-HANDED	33	16.41
TOTAL	201	

Interpretation:

Among the participants, 168 (83.58%) were right-handed, while 33 (16.41%) were left-handed, showing a strong prevalence of right-handedness.

Table no 3: MMT of participants after playing badminton

GRADES	RIGHT(+VE)	LEFT(+VE)	CHI SQUARE	P VALUE
Grade 4	141	29	125.59	<0.0001
Grade 5	28	3	20.14	<0.0001

Interpretations:

The table presents the distribution of positive cases for Grade 4 and Grade 5 on the right and left sides, along with the results of a chi-square test and corresponding p-values.

- **Grade 4:** There is a substantial difference in the number of positive cases between the right (141 cases) and left (29 cases) sides. The chi-square value is **125.59**, with a p-value of **<0.0001**, indicating a highly significant difference. This suggests that positive findings in Grade 4 are significantly more common on the right side than the left.

- **Grade 5:** Similarly, the number of right-sided positive cases (28) is higher than left-sided (3). The chi-square value here is **20.14**, with a p-value of **<0.0001**, again showing a statistically significant difference. This implies that Grade 5 positive results also predominantly occur on the right side.

In both Grade 4 and Grade 5, the data shows a strong, statistically significant tendency for right-sided involvement compared to the left. The very low p-values indicate that these differences are unlikely to have occurred by chance.

Table no 4: NPRS rating of participants after playing badminton

NPRS	MILD(1-3)	MODERATE(4-6)	SEVERE(7-10)	CHI SQUARE	P VALUE
TOTAL	150	49	2		
MALE	50	9	0	4.89	0.0894
FEMALE	100	40	2		

Interpretation:

The table shows the distribution of pain intensity levels (mild, moderate, and severe) among male and female participants, along with the chi-square value and p-value for statistical analysis.

- Out of the total cases, **150** reported mild pain, **49** moderate pain, and only **2** reported severe pain. This indicates that the majority of individuals experienced mild discomfort based on NPRS scores.
- Among **males**, 50 reported mild pain, 9 reported moderate pain, and none reported severe pain.

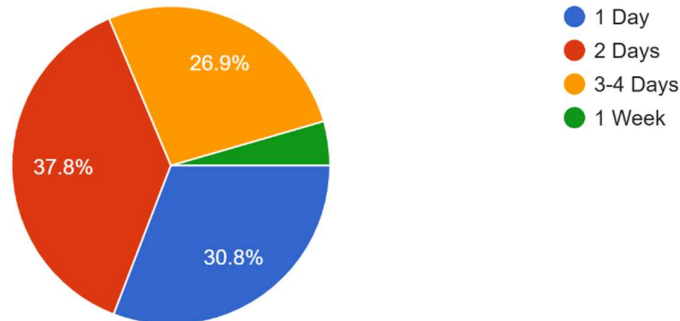
- Among **females**, 100 reported mild pain, 40 reported moderate pain, and 2 reported severe pain.
- The chi-square value is **4.89**, and the **p-value is 0.0894**. Since the p-value is above the conventional significance level of 0.05, **the difference in pain levels between males and females is not statistically significant.**

Although more females reported moderate and severe pain compared to males, the difference is **not statistically significant**. Therefore, the variation in pain intensity between genders could be due to random variation rather than a true difference.

Chart no 1:

3. For how long does the pain last?

201 responses



Interpretations:

A total of **201 individuals** participated in this question. The pain duration is categorized into four ranges:

- **2 Days (Red)** – **37.8%** of respondents experience pain that lasts for 2 days.
- **1 Day (Blue)** – **30.8%** of individuals report that their pain subsides within a single day.
- **3–4 Days (Orange)** – **26.9%** experience pain that continues for 3 to 4 days.

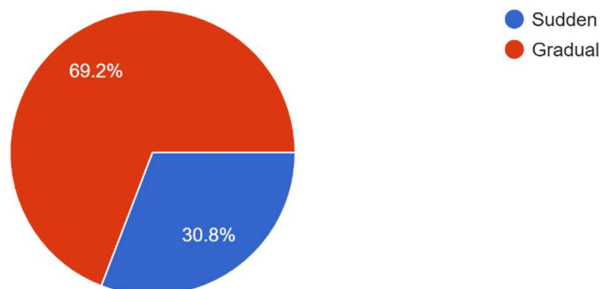
- **1 Week (Green)** – A small portion, **4.5%**, say their pain lasts as long as one week.

Most respondents (nearly 70%) experience pain that lasts up to 2 days, suggesting short-term discomfort after playing badminton. However, a significant portion (about 31.4%) endure longer-lasting pain, ranging from 3 days to a week. This indicates that while for many the issue may be temporary, for others, it could point to a more persistent or recurring problem, possibly due to technique, overuse, or lack of proper recovery.

Chart no 2:

5. How does the pain start?

201 responses



Interpretations:

Based on 201 responses, the chart reveals the following:

- **Gradual onset (Red):** 69.2% of participants reported that the pain starts suddenly.
- **Sudden onset (Blue):** 30.8% of participants indicated that the pain develops gradually.

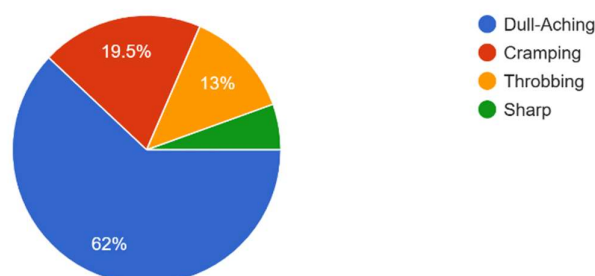
The majority of respondents (nearly 7 out of 10) experience a Gradual onset of pain, suggesting that the

pain might be triggered by specific movements or immediate strain during activity. In contrast, a smaller portion experiences pain that develops suddenly, which may indicate overuse or cumulative stress over time. These insights are crucial for identifying the nature of physical stress involved and for designing appropriate prevention or treatment strategies tailored to the type of pain onset.

Chart no 3:

6. What type of pain do you experience?

200 responses



Interpretations:

The pie chart illustrates the types of pain experienced by 200 respondents.

- **Dull/Aching pain** is the most frequently reported, accounting for **62%** of responses. This suggests that a majority of individuals experience a persistent, less intense type of pain.
- **Cramping pain** is the second most common, reported by **19.5%** of participants. This type often indicates muscle involvement or spasmodic discomfort.

- **Throbbing pain** follows, reported by **13%** of the group. Throbbing pain typically reflects vascular or inflammatory issues.

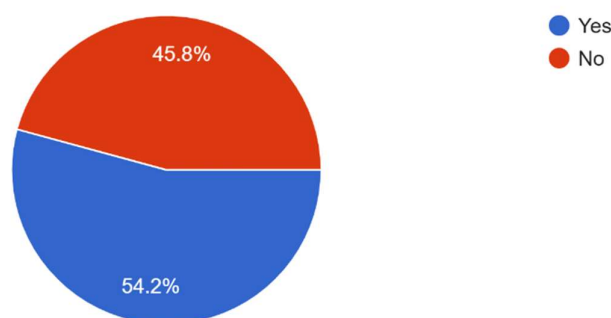
- **Sharp pain**, which is usually intense and sudden, is the least common, reported by a small portion (less than 6%)—though the exact percentage is not labelled, it appears minimal in the chart.

Most individuals in the survey experience dull or aching pain, with relatively fewer reporting cramping, throbbing, or sharp sensations. This distribution may reflect the nature of the condition or activity being assessed, where chronic or low-grade pain is more typical.

Chart no 4:

9. Do you prefer doing warmup before playing?

201 responses



Interpretations:

- 54.2% of respondents said they prefer doing a warm-up before playing.
- 45.8% stated they do not prefer warming up.

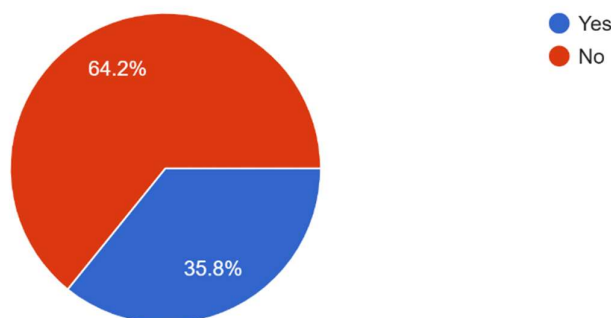
A slight majority of participants acknowledge the importance of warming up before engaging in play or

physical activity. This reflects a generally positive attitude towards injury prevention and physical preparedness. However, the considerable proportion of individuals who skip warm-ups (nearly 46%) points to a potential area for education and improvement in sports or physical training habits.

Chart no 5:

12. Do you prefer doing cool down exercises after the game?

201 responses

**Interpretations:**

Out of 201 participants:

- 35.8% responded Yes, they prefer doing cool down exercises.
- 64.2% responded No.

A significant majority of the participants do not engage in cool down exercises after playing. This trend highlights a potential gap in post-activity recovery practices. Skipping cooldowns could contribute to muscle stiffness, delayed recovery, and increased risk of overuse injuries. Encouraging education on the benefits of cool down routines may help reduce post-game discomfort and enhance overall physical performance and recovery.

Out of 201 participants, 142 (70.65%) were female and 59 male (29.36%). Right-handed dominance was noted in 168 participants (83.58%). A majority (86.6%) reported pain on the outer forearm, typically dull or aching in nature. Pain intensity was mild in 64.7%, moderate in 24.4%, and severe in only 0.9% of participants. Delayed pain onset (2–3 hours post-play) was observed in 44.3%. MMT showed significant right-sided weakness with Grade 4 predominance ($p < 0.0001$). Most players (59.7%) played once yearly, and 42.8% played less than one hour per session. Warm-up (54.2%) and cool-down (35.8%) practices were inconsistently followed.

DISCUSSION

This study was conducted to assess the prevalence and characteristics of brachioradialis pain among recreational badminton players. The findings offer valuable insights into how commonly this issue occurs, the patterns associated with the pain, and the influencing factors such as gender, handedness, duration of play, warm-up and cool-down habits, and history of prior injuries.

The sample included 201 individuals, of which a significant majority were female (70.65%) compared to males (29.36%). This female predominance may reflect either greater participation in the study or a higher representation of female recreational players in the

sampled population. Additionally, the dominance of right-handed participants (83.58%) aligns with general population statistics, which show right-handedness as the norm.

The results from the Manual Muscle Testing (MMT) indicate a significantly higher incidence of Grade 4 and 5 weakness on the right side compared to the left. This statistical significance ($p < 0.0001$) suggests that the dominant hand (commonly the right) may be more prone to muscular fatigue or strain due to overuse. Since most players are right-handed, this finding is logical and supports the idea that repeated forceful strokes using the dominant limb can result in overuse injuries, particularly affecting the brachioradialis.

Analysis of the Numerical Pain Rating Scale (NPRS) data shows that most participants experienced **mild (74.6%) to moderate (24.3%) pain**, with only 0.9% reporting severe discomfort. Though female participants reported slightly higher pain levels, the gender difference in pain scores was not statistically significant ($p = 0.0894$). This suggests that while perception and reporting of pain may vary by gender, the physiological impact of badminton on forearm pain affects both sexes comparably in recreational settings.

A notable proportion of respondents (59.7%) reported playing badminton on a **yearly** basis, indicating that for many, it remains an occasional rather than a regular activity. This irregularity could contribute to muscle overuse or injury due to a lack of conditioning. Additionally, the **duration of play** was less than one hour for 42.78% and 1–2 hours for 40.79% of respondents, suggesting that even brief sessions, when done without proper preparation, may be sufficient to trigger muscular pain, especially in poorly conditioned muscles.

A striking **86.6%** of players reported experiencing outer forearm pain post-gameplay, with the pain lasting **up to 2 days** for most participants. These findings suggest a high prevalence of brachioradialis-related discomfort in this population. Although the majority had transient symptoms, approximately **31.4%** experienced prolonged pain (3 days

to a week), indicating a risk of more persistent musculoskeletal strain.

Pain was more commonly described as **dull/aching (62%)** and **cramping (19.5%)**, which are typically associated with muscle fatigue or microtrauma. Only a small percentage (6%) reported sharp pain, which could be indicative of acute injury. Most respondents (44.3%) reported pain onset within 2–3 hours post-play, which reflects a pattern of **delayed onset muscle soreness (DOMS)**. This delay further reinforces the role of eccentric loading and lack of recovery in contributing to muscle pain.

The findings point to a **lack of adequate preventive practices**: only **54.2%** of participants engaged in warm-up exercises, and even fewer (**35.8%**) practiced cool-down routines. This reflects a significant area for intervention, as these preparatory and recovery activities are known to reduce muscle strain, enhance flexibility, and promote faster recovery.

Just under **half (47.3%)** of the respondents engaged in regular upper limb stretching exercises, while a majority did not follow a **balanced diet (62.2%)**. Both factors can have a direct impact on muscle function, recovery, and injury risk. Poor nutritional practices may impair muscle repair and performance, while inadequate stretching can reduce range of motion and increase susceptibility to strains.

Approximately **27.9%** of participants had a previous injury or fall involving the elbow, which may predispose them to recurrent pain or sensitivity in that region. However, **72.1%** did not report any such history, suggesting that current pain may largely be due to **overuse or poor playing techniques** rather than previous trauma.

More than half (54%) of the participants localized the pain to the **outer forearm**, which aligns well with the anatomical location of the brachioradialis. Given its role in elbow flexion and its activation during backhand strokes, it is plausible that improper mechanics, insufficient muscle endurance, or lack of neuromuscular control could all contribute to this specific pain pattern.

Overall, the data suggest a **high prevalence of brachioradialis pain** among recreational badminton players, especially those who lack proper warm-up, stretching, and nutritional habits. Right-side dominance, inconsistent play, and lack of technical coaching seem to contribute to the muscular strain experienced post-gameplay. Future strategies focusing on **injury prevention education, muscle conditioning, ergonomic guidance, and proper recovery routines** could help mitigate this widespread issue among casual athletes.

CONCLUSION

The study highlights a significant prevalence of brachioradialis pain among recreational badminton players, particularly on the dominant (right) side. A majority of participants reported experiencing mild to moderate pain localized to the outer forearm, often developing a few hours after playing. Factors such as lack of proper warm-up and cool-down routines, insufficient stretching, poor technique, and inadequate muscle conditioning appear to contribute to the occurrence of pain. Although most cases involved short-term discomfort, a notable proportion experienced pain lasting several days, indicating potential for recurrent or chronic strain.

These findings underscore the need for increased awareness about the importance of proper biomechanics, preventive exercises, and muscle care in recreational sports. Targeted education and training interventions can help reduce the risk of forearm injuries and enhance the overall well-being and performance of amateur players.

LIMITATIONS AND FUTURE SCOPE

Limitations: Female predominance and reliance on self-reported data may limit generalizability. Cross-sectional design prevents causal inference. Future research should employ longitudinal designs with biomechanical and EMG analysis to identify precise mechanisms and evaluate intervention efficacy.

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