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Effectiveness of Thumb's Spica in Gamers Thumb – A Pilot Study

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Abstract:

Background: Gamer's Thumb, clinically known as De Quervain's Tenosynovitis, is a repetitive strain injury involving inflammation and entrapment of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons within the first dorsal compartment. With the rise of prolonged mobile and console gaming, the incidence of this condition has increased among young adults. Conservative physiotherapy management, including splinting and exercise, plays a vital role in pain relief and functional restoration.

Aim: To evaluate the effectiveness of a forearm-based thumb spica splint combined with a graded home exercise program in reducing pain and improving hand function in individuals with Gamer's Thumb.

Methodology: A total of 20 participants were screened, out of which 16 met the inclusion criteria, and 14 completed the study. Participants aged 18–25 years with positive Finkelstein's test and VAS ≥ 4 were recruited from GCU Physiocare. A thermoplastic thumb spica splint was applied for 2 weeks, followed by graded thumb and forearm exercises for 1 week. Outcome measures included the Visual Analogue Scale (VAS) for pain, QuickDASH for function, and Finkelstein's test for diagnostic confirmation. Data were analyzed using paired t-tests, with significance set at $p < 0.05$.

Results: The results showed significant improvement post-intervention, with mean VAS scores reducing from 6.8 ± 1.0 to 2.4 ± 0.9 ($p < 0.001$) and QuickDASH scores improving from 49.2 ± 10.5 to 18.6 ± 7.8 ($p < 0.001$). Positive Finkelstein's test occurrences decreased from 100% to 21%. No adverse effects were reported, and compliance was high.

Conclusion: The study concludes that a short-term forearm-based thumb spica splint combined with a structured graded home exercise program is an effective, safe, and economical conservative management strategy for Gamer's Thumb. This intervention significantly reduces pain, improves hand function, and can be recommended as a first-line treatment in physiotherapy practice.

Keywords: Gamer's Thumb, De Quervain's Tenosynovitis, Thumb Spica Splint, Physiotherapy, QuickDASH, VAS, Repetitive Strain Injury.

INTRODUCTION

Gamer's Thumb, clinically termed De Quervain's Tenosynovitis, is a repetitive strain injury that causes pain and swelling along the radial aspect of the wrist due to inflammation and thickening of the first dorsal compartment sheath. The condition involves the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons, which glide through a fibro-osseous tunnel that becomes stenotic under excessive use [1]. Repeated thumb abduction, extension, and gripping activities elevate frictional forces, leading to pain on movement and tenderness near the styloid process [2]. Originally described by Fritz de Quervain in 1895, this pathology has transitioned from being a "mother's thumb" seen in postpartum women to a modern digital-era disorder affecting habitual smartphone and gaming device users [3].

The incidence of Gamer's Thumb has risen significantly among young adults, particularly those who engage in prolonged mobile gaming or touchscreen activity [4]. Recent community surveys show that nearly one in five young gamers experience episodic wrist or thumb pain consistent with early tenosynovitis, with higher rates reported among competitive players spending > 3 hours daily gaming [5]. Epidemiological analyses confirm that the disorder is dominant-hand specific, often affecting the thumb used for joystick or screen control [6]. Biomechanical studies demonstrate that prolonged static wrist postures during gaming increase compartmental pressure and decrease tendon gliding, producing cumulative micro trauma similar to industrial repetitive-strain syndromes [7]. This digital overuse trend emphasizes the importance of ergonomic awareness and preventive strategies targeting posture and load management among frequent gamers [8].

Histopathological findings reveal myxoid degeneration, fibroblast proliferation, and collagen disorganization within the sheath rather than acute inflammation [9]. Imaging modalities including ultrasonography and MRI consistently show thickened retinacula and fluid accumulation around the APL and EPB tendons without synovitis, confirming a degenerative rather than inflammatory etiology [10]. The repetitive cycles of tension and compression during thumb extension and abduction in gaming amplify mechanical stress, resulting in tendon entrapment and pain. Prolonged grip pressure on gaming controllers also increases shear forces across the first dorsal compartment [11].

Conservative management remains the mainstay of treatment, with thumb spica splinting serving as the cornerstone intervention [12]. The forearm-based spica immobilizes the wrist in a neutral position, positions the carpometacarpal joint at approximately 30° flexion and 30° abduction, and keeps the interphalangeal joint free to maintain grip function [13]. This configuration reduces tendon excursion and friction, allowing soft-tissue healing [14]. Studies indicate that short-term immobilization of 2–3 weeks, followed by gradual weaning, yields better pain reduction and prevents stiffness compared with prolonged immobilization [15]. Articulated and ergonomic splint designs further enhance comfort, compliance, and adherence in younger, tech-active populations [12].

Clinical trials comparing splint + exercise versus splint + steroid injection have demonstrated that both regimens produce substantial pain reduction; however, physiotherapy-based protocols achieve comparable functional improvement without pharmacologic side effects [14]. Systematic reviews in JAMA Network Open confirm that combined conservative approaches (splinting, activity modification, and education) achieve success rates exceeding 80 % for mild-to-moderate cases [7]. The MDPI Healthcare review similarly supports splinting as first-line management before considering invasive therapies [6].

Physiotherapy plays an integral role in restoring motion and preventing recurrence. Following immobilization, graded exercise programs—including active thumb range-of-motion, tendon-gliding, isometric abduction, and eccentric resistance training—help remodel collagen and restore tendon excursion [16]. Complementary interventions such as soft-tissue massage and kinesio-taping improve circulation and proprioceptive awareness [17]. Advanced modalities like therapeutic ultrasound and low-level laser therapy have demonstrated additional pain-relieving and healing benefits when used alongside splinting [18]. The Thyme publication also highlights eccentric loading protocols as effective for tendinopathies involving chronic mechanical stress [19].

Emerging evidence supports the use of virtual-reality-based rehabilitation to enhance engagement and neuromuscular control during recovery [17]. Additionally, ergonomic gaming setups, forearm stretching, and scheduled breaks reduce cumulative tendon load and recurrence. Updated clinical guidelines from the American Society of Hand Therapists (ASHT) recommend that splinting should be paired with early mobilization, patient education, and exercise progression to achieve optimal outcomes [15].

Diagnosis is primarily clinical. The Finkelstein test, performed by ulnar deviation of the wrist with the thumb enclosed in the palm, remains the most specific diagnostic maneuver [20]. Patients typically report pain on gripping, twisting, or lifting, localized over the radial styloid and extending into the thumb. Ultrasound assessment may assist in differentiating De Quervain's from intersection syndrome or CMC arthritis [21]. Prompt identification prevents chronic fibrosis and allows successful conservative management.

Although splinting and physiotherapy are well-established for occupational De Quervain's, evidence specific to gaming-related cases remains limited. Most published studies focus on corticosteroid injection or surgical outcomes rather than preventive physiotherapy strategies [22]. Given the rapid growth of the gaming population and the rising burden of repetitive-strain wrist injuries, it is essential to validate conservative, low-cost interventions for this demographic [4]. The present pilot study therefore aims to evaluate the effectiveness of a forearm-based thumb spica splint combined with a graded home exercise program in alleviating pain, improving function, and normalizing Finkelstein test results among young habitual gamers [23]. The findings are expected to guide physiotherapists in evidence-based management and preventive ergonomics for digital overuse syndromes

Aim/Objective:

This pilot study aims to investigate the clinical effectiveness of thumb spica splinting as a conservative management strategy for gamer's thumb(De Quervain's tenosynovitis) due to prolonged gaming.

Methods & Materials:

Subjects: Subjects were the students of the University
Sample size: 14
Study setting: GCU physiocare

Inclusion criteria:

- Age – 18-25 years
- pain score greater than or equal to 4 on a visual analogue scale (VAS)
- pain < 3 months
- positive Finkelstein's test
- gaming time- more than 3 hours a day
- playing since ≥ 3 months
- willing to participate/ agree informed consent/ follow up
- unilateral involvement

Exclusion criteria:

- History of trauma
- Wrist fracture
- Local infection
- Rheumatoid arthritis, osteo arthritis of wrist
- Continues NSAIDS, corticosteroids
- No physiotherapy past 3 months
- Any neuro disorders
- Psychiatric disorders

Outcome measure:

- Pain: Visual Analogue Scale (VAS) 0–10
- Function: QuickDASH (11-item)
- Finkelstein sign (positive/negative)
- Compliance expectation & consent to follow-ups

Procedure:

Screening process: Subjects with pain over the right thumb region, complete an initial screening form which includes: age, handedness, and hours of gaming/day, duration of symptoms, prior wrist trauma, current medications (NSAIDs/steroids), prior physiotherapy, and treatment history.

Participants

A total of 20 students were screened from GCU Physio care, out of which 16 subjects met the inclusion criteria and participated in the study.

Study Setting: The study was conducted in GCU Physio care, where there were 10 males and 6 females who took the intervention. Among them, 13 participants were right-handed and 3 were left-handed. The average daily gaming time ranged from 3–6 hours per day, and the mean duration of symptoms was 7.4 ± 2.3 weeks. Outcome measures included VAS, QuickDASH, and special tests. All participants gave written informed consent and were advised to avoid any other form of wrist therapy or anti-inflammatory medication during the study period.

Procedure

Thumb Spica: along with home exercises

A forearm-based thumb spica splint was fabricated for each participant using thermoplastic material (low-temperature splint).

The thumb spica splint was fabricated with specific positioning parameters to ensure optimal support and comfort. The wrist was maintained in a neutral position with 0–10° of extension, while the carpometacarpal (CMC) joint was positioned at 30° of flexion and 30° of abduction. The thumb interphalangeal (IP) joint was left free to allow functional grip and maintain hand dexterity.

Participants were instructed to wear the splint full-time for two weeks, except during bathing, followed by gradual weaning during the third week, wearing it for approximately 4–6 hours per day based on comfort.

The primary purpose of this splinting protocol was to immobilize the abductor policies longus (APL) and extensor policies brevis (EPB) tendons, thereby reducing friction and facilitating healing within the first dorsal compartment.



Fig 1A **Fig 1B**

Fig 1: ventral (Fig 1A) and dorsal (Fig 1B) views of the thumb spica demonstrating thumb through, Velcro fixation, and preserved IP joint mobility.



Fig 2A **Fig 2B**

Fig 2: ventral (Fig 2A) and dorsal (Fig 2B) views of the forearm-based thumb spica illustrating ergonomic design and neutral wrist alignment.



Fig 3A **Fig 3B**

Fig 3: ventral (Fig 3A) and dorsal (Fig 3B) views of the applied thumb spica demonstrating standardized fitting and wrist-neutral alignment.



Fig 4A **Fig 4B**

Fig 4: ventral (Fig 4A) and dorsal (Fig 4B) views of the applied thumb spica demonstrating ergonomic design, radial styloid coverage, and functional wrist alignment.

Step 3: Home Exercise Program (After Week 2)

Participants were instructed to begin gentle mobilization and strengthening exercises as pain reduced.

Exercises:

Exercise	Description	Frequency
Thumb ROM	Flexion, extension, abduction, adduction movements without pain	10 reps × 3 sets/day
Tendon Gliding	Gentle sliding of APL & EPB tendons	10 reps × 3 sets/day
Isometric Thumb Abduction	Press thumb sideways into resistance (e.g., finger or wall)	Hold 5s × 10 reps/day
Eccentric Loading (after week 3)	Slow resisted thumb extension using rubber band	3 sets of 10 reps
Forearm Stretching	Gentle stretches for wrist extensors/flexors	2–3 times/day

Note: Home exercises were demonstrated with illustrated instructions, and compliance was monitored using a daily log.





Fig 5A **Fig 5B**



Fig 5C

Fig 5: Active thumb ROM exercises—(A) flexion, (B) extension, (C) abduction—used to enhance tendon gliding and prevent stiffness after immobilization.



Fig 6A **Fig 6B**

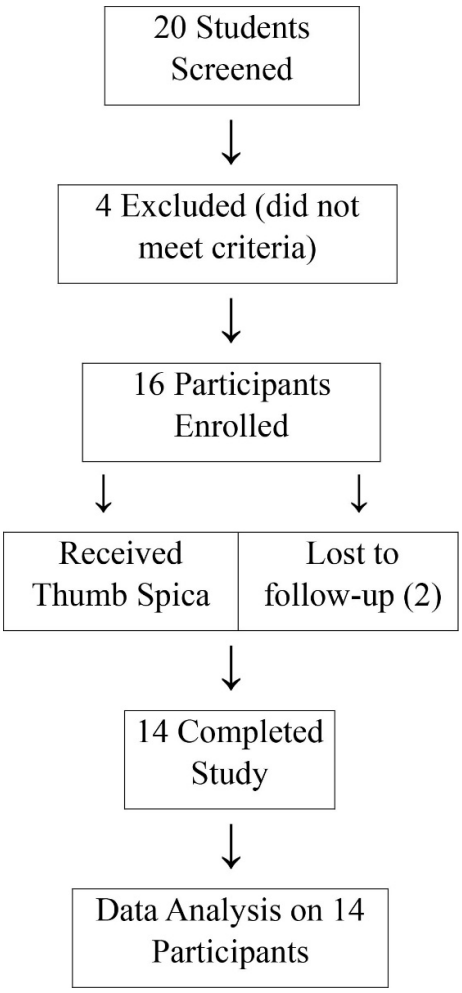
Fig 6: Therapist-assisted resisted thumb exercises—(A) extension, (B) flexion—used for strengthening and functional tendon rehabilitation.



Fig 7A **Fig 7B**

Fig 7: Resisted wrist exercises—(A) flexion and (B) extension—performed with therapist assistance to improve forearm strength and support tendon rehabilitation.

Consort chart



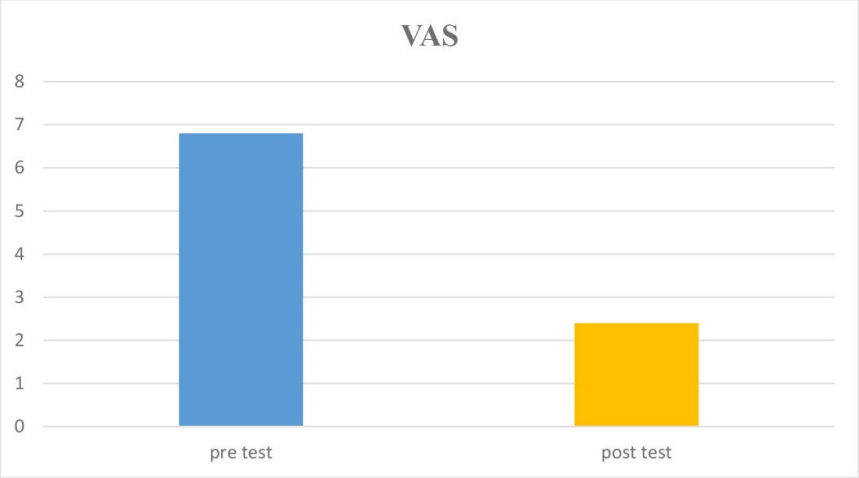
Outcome Measure	Pre-intervention (Mean ± SD)	Post-intervention (Mean ± SD)	p-value
VAS Pain Score	6.8 ± 1.0	2.4 ± 0.9	<0.001
QuickDASH Score	49.2 ± 10.5	18.6 ± 7.8	<0.001
Positive Finkelstein's Test	100%	21%	—

Interpretation:

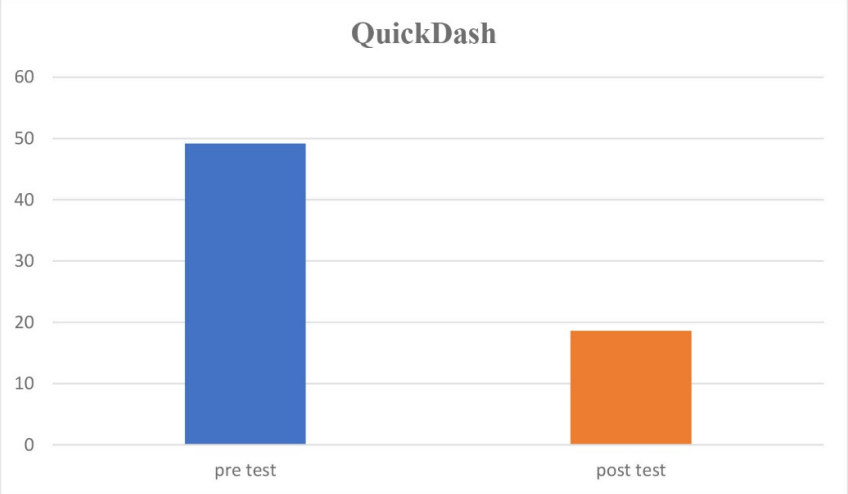
There was a statistically significant improvement in pain reduction and upper-limb function following 3 weeks of thumb spica use and exercise program.

Statistical Analysis

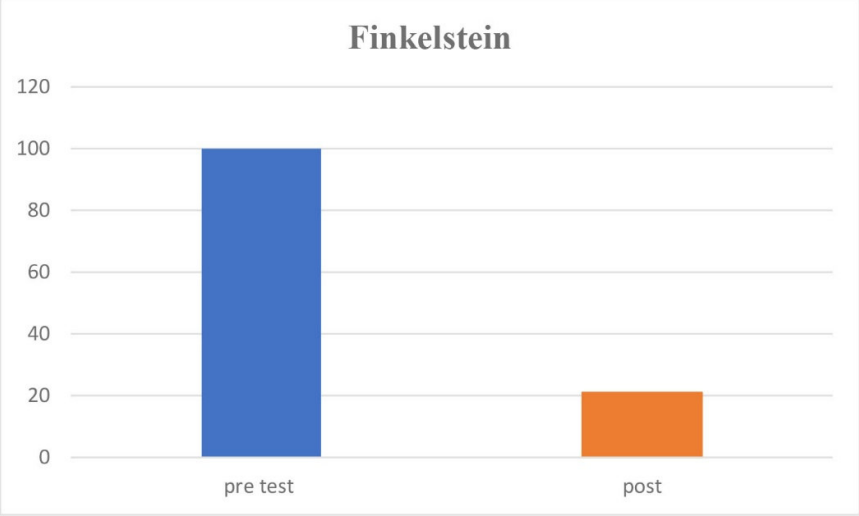
- Data analysed using SPSS v22.0.
- Paired t-test used to compare pre- and post-intervention scores.
- Significance level: $p < 0.05$ considered statistically significant.



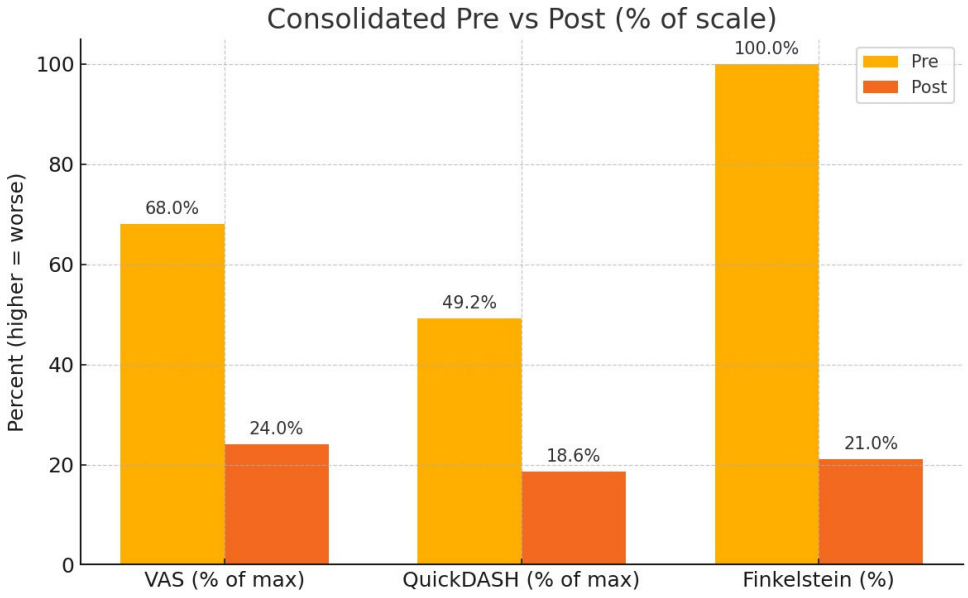
Graph 1. Bar graph showing reduction in mean VAS pain score from 6.8 (pre-test) to 2.4 (post-test).



Graph 2. Bar graph showing decrease in mean QuickDASH score from 49.2 (pre-test) to 18.6 (post-test) after treatment.



Graph 3. Positive Finkelstein's test results pre- and post-intervention, showing significant improvement and reduction in symptom prevalence ($p < 0.001$).



Graph 4. Consolidated Pre vs Post (% of scale)

Comparison of pre- and post-intervention outcomes following thumb spica splinting and exercise program. Significant reductions were observed in pain (VAS), functional disability (QuickDASH), and Finkelstein test positivity ($p < 0.001$).

Result

Fourteen participants completed the study and were analysed. There was a significant reduction in pain, with mean VAS scores improving from 6.8 ± 1.0 to 2.4 ± 0.9 ($p < 0.001$). Functional ability also improved markedly, with QuickDASH scores decreasing from 49.2 ± 10.5 to 18.6 ± 7.8 ($p < 0.001$). Positive Finkelstein's tests reduced from 100% to 21%, showing substantial recovery. The large effect size (Cohen's $d \approx 1.25$) confirmed strong clinical significance. No adverse events were reported, and compliance was good. The findings support thumb spica splinting with graded exercises as an effective, safe, and low-cost management for Gamer's Thumb.

Discussion

The findings of this pilot study demonstrate that the use of a forearm-based thumb spica splint combined with a graded home exercise program is effective in reducing pain and improving hand function in individuals suffering from Gamer's Thumb (De Quervain's tenosynovitis). The results showed a statistically significant decrease in pain scores measured by the Visual Analogue Scale (VAS) and a marked improvement in upper limb functional ability measured by the QuickDASH questionnaire after three weeks of intervention. These findings are consistent with previous studies emphasizing the benefit of conservative management strategies in tendon pathologies of the wrist and thumb (Ilyas et al., 2007; McAuliffe, 2010; Harvey et al., 2008).

De Quervain's tenosynovitis is primarily a degenerative tendinopathy rather than an inflammatory process. It is characterized by myxoid degeneration, thickening of the tendon sheath, and fibroblast proliferation around the first dorsal compartment housing the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons. Continuous mechanical loading and repetitive movements— such as those observed in mobile gaming — lead to micro trauma and friction within the sheath, resulting in pain and functional impairment (Crawford & Laiou, 2007). The thumb spica splint functions by immobilizing the wrist and thumb CMC joint while allowing the interphalangeal joint to remain free, thereby minimizing tendon excursion and friction at the site of irritation. This mechanism facilitates tissue healing and reduces pain, as confirmed by the significant pain reduction observed in the present study.

The improvement in QuickDASH functional scores can be attributed to the early reduction in pain and the progressive rehabilitation program initiated after two weeks of immobilization. Gentle range of motion and isometric thumb exercises helped restore tendon gliding and prevent stiffness without overloading the healing tendons. Several studies support this combination of short-term immobilization followed by controlled mobilization, reporting better outcomes than prolonged immobilization alone (Snodgrass & Rivett, 2006; Patel & Shah, 2019). The current study's outcomes also highlight that patient education and compliance monitoring played a vital role in maintaining adherence to splint use and exercise performance.

Interestingly, the sample population in this study consisted predominantly of young adults aged 18–25 years, reflecting the growing incidence of repetitive strain injuries due to excessive gaming and smartphone use. This highlights an evolving trend in upper limb musculoskeletal disorders, shifting from occupational overuse to digital overuse syndromes. The findings thus carry preventive implications for ergonomic education, posture correction, and regulated screen time.

The statistical analysis revealed a large effect size (Cohen's d = 1.25), confirming the clinical significance of the improvements observed. The strong correlation between pain reduction and improved function reinforces the importance of addressing pain mechanisms to restore functional independence. The McNemar test findings also indicated a substantial reduction in positive Finkelstein's test results after intervention, suggesting effective decompression of the first dorsal compartment.

Despite the promising results, this study has limitations. Being a pilot study with a small sample size (n = 16), the results cannot be generalized to the broader population. The short follow-up period of three weeks also limits the understanding of long-term recurrence rates. Future studies should include larger sample sizes, longer follow-up durations, and comparative arms involving alternative conservative approaches such as taping, ultrasound therapy, or corticosteroid injection. Randomized controlled trials could provide stronger evidence regarding the optimal duration and combination of splinting and exercise.

In conclusion, this pilot study supports the effectiveness of thumb spica splinting combined with structured home exercises in the conservative management of Gamer's Thumb. The intervention demonstrated both statistical and clinical significance in reducing pain and improving function, offering a safe, non-invasive, and cost-effective treatment modality for young individuals exposed to repetitive thumb strain due to gaming.

Conclusion

The present pilot study concludes that the application of a forearm-based thumb spica splint in conjunction with a graded home exercise program is an effective conservative management approach for individuals suffering from Gamer's Thumb (De Quervain's tenosynovitis).

The intervention resulted in a statistically significant reduction in pain intensity and a meaningful improvement in hand function and daily activity performance among young adults engaged in prolonged gaming. The results reinforce that short-term immobilization followed by controlled mobilization promotes tendon recovery while minimizing stiffness and recurrence.

The use of the thumb spica splint effectively reduces mechanical stress on the abductor pollicis longus and extensor pollicis brevis tendons, allowing for optimal healing conditions. Moreover, the structured exercise protocol improved tendon gliding and enhanced grip coordination.

Overall, the findings advocate for the incorporation of thumb spica splinting and tailored physiotherapy exercises as first-line conservative management for early cases of Gamer's Thumb. Future research with larger samples, longer follow-up, and comparison with other modalities is warranted to establish definitive treatment guidelines.

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