Effectiveness of Nighttime Splinting for Adults with Trigger Finger: A Systematic Review

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Abstract: Individuals who are diagnosed with stenosing tenosynovitis, more commonly known as trigger finger, often experience functional limitations that affect their ability to engage in meaningful occupations throughout their day. Symptoms include pain, decreased range of motion, weakness, clicking/locking, and an overall decrease in hand function. This systematic review summarized articles published between 2014 and 2024 and investigated the effectiveness of various splinting schedules for trigger finger symptoms. It was found that splinting and splinting schedules can be utilized for symptom management and improvement of trigger finger but requires further research for improvements in validity and reliability.

Importance: Functional use of the hands is a beneficial ability to have to perform activities of daily living and desired occupations. Nighttime splinting is a positive intervention to use for patients with trigger finger that can increase the functional use of the hands to perform such desired ADLs and occupations with more independence.

Objective: To identify, evaluate, and synthesize the current literature concerning nighttime splinting to determine the efficacy of increasing the functional use of the hand for adults with trigger finger.

Data Sources: A literature search occurred between May 2024 and June 2024. Databases included Medline, Pubmed, Sage Journals, and EBSCO Host using Hawai'i Pacific University's online library databases. Search terms included trigger finger, effective intervention, functional use, nighttime splinting, and treatment, as well as combinations of these terms.

Study Selection and Data Collection: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published studies on splinting for trigger finger were included in the systematic review. Data from presentations, non-peer reviewed literature, and dissertations were excluded.

Findings: Five studies were included with one Level 1 and four Level III studies according to the American Occupational Therapy Association's Levels of Evidence. The outcomes of these studies indicate that nighttime splinting is an effective intervention to improve functional use of the hand affected by trigger finger.

Conclusion and Relevance: Nighttime splinting is effective and improves functional use of the hand for adults with trigger finger.

What This Systematic Review Adds: There are limited high quality studies that evaluate splinting for trigger finger. This systematic review provides a starting point for evaluating the efficacy of nighttime splinting in OT practice. More research is needed to further learn the schedules needed for nighttime splinting as well as alternatives to this intervention to get the same outcome of functional use of the hands with trigger finger.

Key words: Effective intervention, functional use, nighttime, orthotic, QuickDASH, splint, treatment, trigger digit, trigger finger.

Introduction

Trigger finger, or stenosing tenosynovitis, is a condition that commonly affects the first and fourth digits of the hand and affects almost 2.6% of the population, increasing to 10% for the diabetic population (Langer et al., 2016). This condition is more commonly diagnosed in middle aged women, individuals with diabetes, and individuals with disorders that develop into tissue changes. The flexor digitorum superficialis and profundus are meant to glide smoothly through the tendon sheath (Atthakomol et al., 2023). In trigger finger, the tendon sheath becomes inflamed and irritated causing misalignment when moving through the sheath, creating a nodule and making it difficult to flex and extend the affected finger. The A1 pulley metacarpophalangeal joint is most affected.

The most common noninvasive intervention approach is splinting, whereas other treatment options include steroid injections or surgery. The use of splinting helps prevent nerve compression along with improving functional movement. Evidence suggests that a custom fitted orthotic device is effective to mitigate symptoms without complications. The following studies were reviewed to better understand if night splinting and various wear schedules are beneficial for treating symptoms of trigger finger.

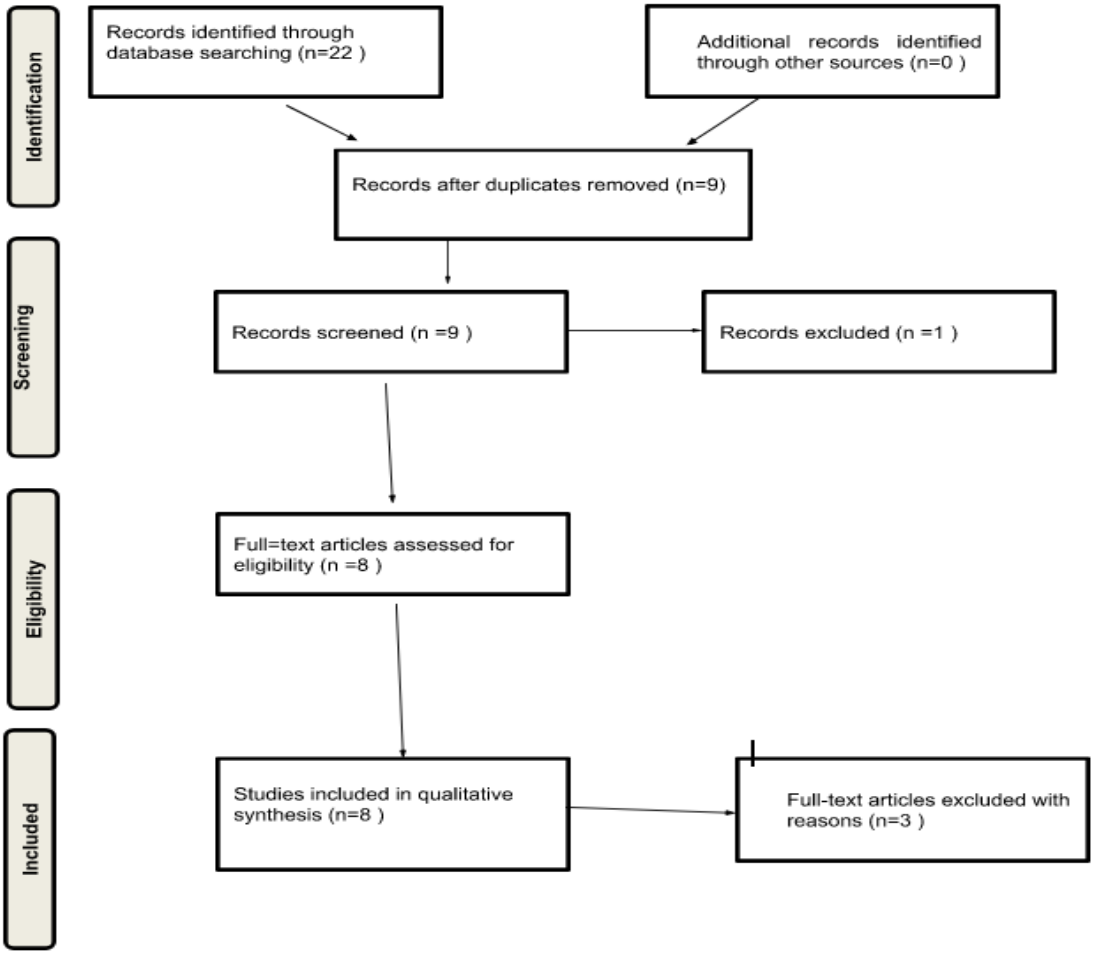
Method

The systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and incorporated recommended processes for conducting a systematic review. The guiding research question for this systematic review was: Is nighttime splinting an effective intervention for patients experiencing trigger finger to increase functional use of the affected hand?

A broad search of the literature occurred between May 2024 and June 2024. The inclusion criteria for studies in this systematic review were as follows: peer-reviewed, published in English, and dated between 2014-2024. Exclusion criteria, in addition to those studies that did not meet the inclusion criteria, included articles that were systematic reviews, scoping reviews, dissertations, and presentations. A search for relevant literature was completed using electronic databases: Medline, Pubmed, Sage Journals, and EBSCOHost through Hawai'i Pacific University's online library database. Search terms included trigger finger, effective intervention, functional use, nighttime splinting, and treatment, as well as combinations of these terms. Appendix A provides an extensive list of all search terms used for this systematic review. The initial search included eight articles related to the research topic (Figure 1). Four independent reviewers completed the screening and selection of the studies, assessed their quality, and extracted the data.

Figure 1

PRISMA Flow Diagram



Results

Five studies met the inclusion criteria. The articles were assessed according to their risk of bias, level of evidence, and quality. This systematic review included five studies that contained relevant information regarding the effectiveness of nighttime splinting for trigger finger. The information from these articles was divided into two themes: Splinting at Night and Multiple Splinting Schedules. An evidence table is provided in Appendix B. The Cochrane risk-of-bias guidelines were used to assess each article and are provided in Appendix C.

Splinting at Night

Three of the five studies on the topic discussed the efficacy of splinting only at night for trigger finger. Two of these studies were Level III and one was Level I. All studies provided evidence that splinting at night is effective and potentially beneficial.

Atthakomol et al. (2023) compared the effectiveness of splinting alone, steroid injections alone, and a combination of both. The results showed no difference after the six-week follow- up between the splint group and the injection group. A very slight difference between the splint and injection group alone versus the combination improvement being at 7%. This was the same after the 12-week follow-up. At the 52 week follow up, 66% of participants noticed improvement in the trigger finger. Regarding the participants who were in the splint only and combination group, they wore the splints at night for eight to 12 hours and had the best results. Evidence supports that splinting is an effective intervention when used with steroid injection.

Similarly, Coulbourn et al. (2008) investigated the effectiveness of nighttime splinting and concluded that it is an efficient intervention for trigger finger. Results of the Stages of Stenosing Tenosynovitis (SST) assessment showed that the number of participants that were rated a one or two increased by 60.7%. The number of participants who reported pain decreased from 10 participants at pretest to one participant at posttest. The results of the 10 active fists test showed that the number of participants that had a score of 0/10 doubled from 10 to 20 participants, indicating improvement.

Drijkoningen et al. (2018) found effective evidence that nighttime splinting is effective in treating trigger finger. The results showed that participants had a mean satisfaction rate of 5.8. The mean QuickDASH score decreased from 24 to 16 after the 4-6 weeks of splint wearing, indicating improvement. The mean pain intensity score also decreased from 3.8 to 2.6. Finally, 18 out of the 33 reported complete resolution of the triggering of their affected finger after completing the nighttime splinting schedule.

Multiple Splinting Schedules

Two of the five studies compared effectiveness of multiple splinting schedules for trigger finger. Both studies were Level III. The studies found that some form of continuous splinting resulted in the most positive outcomes.

Avery et al. (2020) compared the outcomes for three different groups. The three different groups were: (1) wearing splints while sleeping only, (2) while only awake, and (3) continuously wearing a splint. The results support that splinting is an efficient intervention for trigger finger. Results of the QuickDASH demonstrated increased function within the range of 8.34 - 96.78%. The sleeping wear and continuous wear groups all reported no pain in the post test. The walking wear group only had reduction in pain in some digits. According to the Froimson's scale the

sleeping group showed that two of three digits had complete resolution of symptoms, the waking wear group showed improvement for only one of six digits, and the continuous wear group showed one of five digits had complete resolution of symptoms.

Similarly, Valdes, (2012) examined the effectiveness of a continuous splinting schedule for individuals with trigger finger. This study consisted of 17 participants with trigger finger in more than one digit and 29 participants with isolated trigger finger. Custom thermoplastic orthotic devices were made for the trigger finger digit(s). Participants were told to wear the splint continuously and if there were no improvements by week six to continue to wear the splint for an additional four weeks. The study showed a significant improvement in trigger finger with a 87% success rate with this intervention approach. This rate was determined by the number of participants who did not require further investigation in the year following the study device application.

Discussion

The results of this systematic review suggest that nighttime splinting is effective in improving hand function for individuals with trigger finger. Three of the five studies were categorized into night splinting and two of the studies into multiple splinting schedules, thus allowing researchers to determine effectiveness of orthotic interventions for this specific condition. Outcome measures included pain, patient satisfaction, resolution of symptoms, and need for further intervention. Also noted is the similarity in assessments used in each study. The most common assessment, used in five out of six studies, being the DASH (Disabilities of the Arm, Shoulder, and Hand) or QuickDASH, suggesting usability and efficacy.

Four of the five studies were found to have moderate risk of bias, and one with low risk of bias. This suggests possible concerns about validity and therefore requiring further, more extensive review. There is evidence that nighttime splinting is effective in treating trigger finger and increasing patient outcomes, though further investigation would be useful in building upon these findings and establishing validity.

Limitations

Limitations of one of the studies included lack of representation of stage four trigger finger and failure to include the first three weeks of the intervention in the study (Atthakomol et al., 2023). Two studies had a small sample size and require further investigation (Avery et al. 2020; Coulbourn et al. 2008). One study was altered after the first visit due to one participant revealing that they did not have a trigger finger diagnosis (Drijkoningen et al., 2018). One study had potential for bias in patient-reported information and a lack of patient centered outcome measures (Valdes, 2012).

Implications for Occupational Therapy Practice

Splinting is a commonly used intervention for individuals diagnosed with trigger finger that has been found to decrease symptoms and increase hand function, subsequently increasing independence in ADL and IADLs. The large variety of splinting options allows practitioners to tailor interventions to individual patients, therefore increasing therapeutic outcomes. This allows practitioners to provide client-centered care which is what gives occupational therapy its distinctive value. Further research is needed to reach a better understanding of this diagnosis and its implications on daily life.

- Nighttime splinting is an effective intervention that does not significantly limit daily life tasks.
- Splinting can facilitate independence in patients by increasing functional use of the hand.
- Splinting can be tailored to meet individual needs and desired outcomes.
- Nighttime splinting requires more research to better understand its efficacy as a conservative treatment for trigger finger.

Conclusion

Studies included within this systematic review provide evidence on the effectiveness of nighttime splinting for trigger finger. Additional research is necessary to learn schedules needed for nighttime splinting, as well as alternative interventions that result in similar outcomes. The evidence suggests that nighttime splinting is an effective intervention for patients with trigger finger that can lead to increased functional use of the hands to perform desired occupations.

References

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Appendix A

Search Terms

Trigger finger
AND
Effective intervention
AND
Functional use
AND
Nighttime splinting
AND
Treatment

Appendix B

Evidence Table

Trigger Finger Evidence Table					
Author/Year	Level of Evidence Study Design Risk of Bias	Participants Inclusion Criteria Study Setting	Intervention and Control Groups	Outcome Measures	Results
Valdes (2012)	Level of evidence: 3 Retrospective case-control Low risk of bias	17 participants with trigger finger in more than one digit; 29 with isolated trigger finger Inclusion criteria: participants with trigger finger in one or more digits who received orthosis; individuals whose charts had complete information on measures of interest at initial, ten weeks, and one-year points Private practice outpatient therapy facility	Custom thermoplastic orthotic devices for trigger finger digit(s)	Visual analog scale (VAS) SST (stages of stenosing tenosynovitis) DASH Pain Scale Wolfe Scale Quinnell Grade Nominal scale for frequency of triggering Subject perceived improvement scales	87% success rate determined by the number of participants who did not require further intervention (either surgical intervention or injection) in the year following orthotic device application

Atthakomol et al. (2023)	Level of Evidence: 1 Randomized control trial Low risk of bias	165 participants met the criteria for trigger finger. 27% (45) of those participants were excluded due to already receiving the steroid injection. 120 participants were randomly split into 3 groups. 1 group receiving splinting, 1 group receiving the injection, and the last group receiving both. Orthopedic outpatient clinic	Receiving finger splints alone, or steroid injection alone or combination of splints and injection. Follow-up questionnaire at 6, 12, and 52 weeks No control group	Quinnell grade Michigan hand questionnaire (MHQ) VAS scores DASH	No difference after the 6-week follow-up between the splint group and injections group. A very slight difference between the splint and injection alone versus the combination 7%. Same after the 12-week follow-up. At the 52 week follow up 66% of participants noticed improvement in the trigger finger.
Avery et al. (2020)	Level of evidence: 3 Single subject case series Low risk of bias	9 adult participants (6 female and 3 male) between the ages of 45-74. Randomly placed into 3 different wear groups: waking (wear when awake), continuous (continuously wear) and sleeping (wear while only sleeping)	No control group Pre and post treatments were collected and compared	QuickDASH NPRS Froimson's scale	Results of the QuickDASH showed increased function within the range of 8.34 - 96.78%. Sleeping wear group: All reported no pain in the post test.

		Inclusion criteria: had to be referred for hand therapy with a single digit of trigger finger. They had to be willing to participate in the study.			Continuous wear group: All reported no pain in the post test. Waking wear group: only 2 of the 6 digits reduced in pain. Froimson's Scale: sleeping group: 2 of 3 digits had complete resolution of symptoms. Waking wear group: 1 of 6 digits had complete resolution of symptoms. Continuous wear group: 1 of 5 digits had complete resolution of symptoms.
Colbourn et al. (2008)	Level of evidence: 3 Single group study	Single group study of 28 participants (21 female/7 male) between the ages of 44-80 years old with	No control group. Pre and post treatments were	NPRS SST	**SST:** The number of participants that were rated a 1 or 2 increase from 4 participants (14.3%) to 21

	Low risk of bias	low-profile custom MCP blocking splint. Clinical Setting Inclusion: Single digit trigger finger per hand and willing to participate.	collected and compared	Number of triggering events in 10 active fists	participants (75%). An increase of 60.7%. **NPRS:** The number of participants who reported pain decreased from 10 participants at pretest to 1 participant at posttest. **10 active fists:** The number of participants that had a score of 0/10 doubled from 10 to 20 participants

Drijkoningen et al. (2018)	Level of Evidence: 3 One group, non-randomized pre-posttest study Low risk of bias	Inclusion: Quinnell grade of 1 or 2 trigger finger or thumb (no more than 3 months). 34 patients, 22 females and 12 males with a mean age of 61.	Nighttime splinting- custom made volar hand-based orthoplast orthotic. No control group	Quick DASH Explanatory variables include sex, hand dominance, affected side, duration of symptoms, prior treatment, and age. The option of corticosteroid injection was discussed if the participant did not notice improvement after 6 weeks.	Patients had a mean satisfaction rate of 5.8. Mean QuickDASH score decreased from 24 to 16 after 4-6 weeks of splinting. Mean pain intensity score went from 3.8 to 2.6. 18 out of the 33 reported a complete resolution of the triggering of their finger.

Appendix C

Risk-of-Bias Tables

Risk-of-Bias Table: Randomized Controlled Trial (RCT) and Non-RCT										
	Selection Bias (Risk of bias arising from randomization process)			Performance Bias (effect of assignment to intervention)		Detection Bias		Attrition Bias	Reporting Bias	Overall risk-of-bias (low, moderate, high
Citation	Random Sequence Generation	Allocation Concealment (until participants enrolled and assigned)	Baseline difference between intervention groups (suggest problem with randomization?)	Blinding of Participants During the Trial	Blinding of Study Personnel During the Trial	Blinding of Outcome Assessment: Self-reported outcomes	Blinding of Outcome Assessment: Objective Outcomes (assessors aware of intervention received?)	Incomplete Outcome Data (data for all or nearly all participants	Selective Reporting (results being reported selected on basis of the results?)	
Atthakomol et al., 2023	+	+	+	-	+	+	-	+	+	Low risk

Note. Categories for risk of bias are as follows: Low risk of bias (+), unclear risk of bias (?), high risk of bias (–). Scoring for overall risk of bias assessment is as follows: 0–3 minuses, low risk of bias (L); 4–6 minuses, moderate risk of bias (M); 7–9 minuses, high risk of bias (H).

Citation. Table format adapted from Higgins, J. P. T., Sterne, J. A. C., Savović, J., Page, M. J., Hróbjartsson, A., Boutron, I., . . . Eldridge, S. (2016). A revised tool for assessing risk of bias in randomized trials. Cochrane Database of Systematic Reviews 2016, Issue 10 (Suppl. 1), 29–31. https://doi.org//10.1002/14651858.CD201601

Risk of Bias for Before-After (Pre-Post) Studies with No Control Group												
Citation	Study question or objective clear	Eligibility or selection criteria clearly described	Participants representative of real-world patients	All eligible participants enrolled	Sample size appropriate for confidence in findings	Intervention clearly described and delivered consistently	Outcome measures pre-specified, defined, valid/reliable, and assessed consistently	Assessors blinded to participant exposure to intervention	Loss to follow-up after baseline 20% or less	Statistical methods examine changes in outcome measures from before to after intervention	Outcome measures were collected multiple times before and after intervention	Overall risk of bias assessment (low, moderate, high risk)
Colbourn et al., 2008	+	+	+	+	-	+	-	-	-	+	-	Moderate
Valdes, 2012	+	+	+	+	-	+	-	-	-	+	+	Moderate
Avery et al., 2020	+	+	+	+	-	+	-	-	-	+	-	Moderate
Drijkoningen et al., 2018	+	+	+	+	-	+	+	-	-	+	-	Moderate

Note. Y = yes; N = no; NR = not reported. Scoring for overall risk of bias assessment is as follows: 0–3 N, Low risk of bias (L); 4–8 N, Moderate risk of bias (M); 9–11 N, High risk of bias (H).

Citation. Table format adapted from National Heart Lung and Blood Institute. (2014). Quality assessment tool for before–after (pre–post) studies with no control group. Retrieved from https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools