

## FANTASTIC FINDINGS

# A Retrospective Observational Study on Hackett-Hemwall Dextrose Prolotherapy for Unresolved Hand and Finger Pain at an Outpatient Charity Clinic in Rural Illinois

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## ABSTRACT

Hand and finger pain and stiffness are common problems that can affect the productivity of those afflicted, especially in regard to their activities of daily living. Prolotherapy is an injection treatment used to initiate a healing response in injured connective tissues such as tendons and ligaments, tissues commonly involved with hand and finger injuries. A retrospective observational study on Prolotherapy for hand and finger pain was done at an outpatient charity clinic.

**Objective:** To investigate the outcomes of patients undergoing Hackett-Hemwall dextrose Prolotherapy treatment for unresolved hand and finger pain.

**Design:** Forty patients, who had been in pain an average of 55 months (4.6 years), were treated quarterly with Hackett-Hemwall dextrose Prolotherapy. Patients were contacted an average of 18 months following their last Prolotherapy session and asked questions regarding their levels of pain and stiffness before and after their last Prolotherapy treatment.

**Results:** In these 40 patients, 98% had improvements in their pain. Eighty-two percent had 50% or more pain relief. Dextrose Prolotherapy caused a statistically significant decline in patients' pain and stiffness. Prolotherapy helped all but one patient on pain medications reduce the amount of medications taken. All 40 patients have recommended Prolotherapy to someone.

**Conclusion:** In this retrospective observational study, Hackett-Hemwall dextrose Prolotherapy treatments helped reduce the pain and stiffness in patients with unresolved hand and finger pain.

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**KEYWORDS:** carpometacarpal joint, degenerative arthritis, finger pain, hand pain interphalangeal joint, Prolotherapy.

## INTRODUCTION

The optimal long-term, symptomatic therapy for chronic hand and finger pain has not been established. Symptomatic hand pain and stiffness due to osteoarthritis (OA) affect approximately 6-8% of the US adult population.<sup>1,2</sup> The prevalence of hand OA tends to be higher in women and elderly persons.<sup>3-5</sup> It may be diagnosed via radiological tests (eg. X-ray), reported joint symptoms, or a combination, with the most commonly affected sites being the distal interphalangeal (DIP) and first carpometacarpal (CMC) joints, followed by the proximal interphalangeal (PIP) and other CMC joints.<sup>6</sup>

While hand osteoarthritis is a common cause of hand and finger pain and stiffness in older populations, athletic injuries, overuse, and excessive forces are the causes typically associated with younger populations.<sup>7-9</sup> Hand and finger pain may affect a person's activities of daily living and quality of life enough that they seek medical attention.

The traditional and conservative treatments for unresolved hand and finger pain can include topical and oral analgesics, non-steroidal anti-inflammatory (NSAID) medications, rest, exercise, splints and taping, corticosteroid injections, and surgery, though each has its own risks or lack of efficacy.<sup>10-15</sup> Two of the more widely used pain treatments include corticosteroid injection and NSAID medications, however, these can accelerate osteoarthritis and further damage the joint.<sup>16, 17</sup> In addition, anti-inflammatories may not provide much long term pain relief, as seen in a randomized controlled trial which showed that corticosteroid injections in the carpometacarpal joint of the thumb for osteoarthritis

were no better than a placebo in reducing pain when compared at 24 weeks.<sup>18</sup> Because of the limited response of chronic joint pain to traditional therapies, many people are turning to alternative therapies, including Prolotherapy, for pain control.<sup>19, 20</sup>

Dextrose Prolotherapy is becoming more widely used for symptoms related to pain and joint dysfunction in both integrative and allopathic medicine. Its primary application is in pain abatement associated with tendinopathies and ligament sprains in peripheral joints.<sup>21, 22</sup> It is also being used in the treatment of spine and joint degenerative arthritis.<sup>23, 24</sup> The effectiveness of Prolotherapy is still being debated, with promising but mixed results being reported.<sup>25-27</sup>

George S. Hackett, MD, coined the term Prolotherapy.<sup>28</sup> As he described it, “The treatment consists of the injection of a solution within the relaxed ligament and tendon which will stimulate the production of new fibrous tissue and bone cells that will strengthen the “weld” of fibrous tissue and bone to stabilize the articulation and permanently eliminate the disability.”<sup>29</sup> Dr. Hackett introduced Prolotherapy to Gustav Hemwall, MD, in the mid-1950s. Dr. Hemwall continued Dr. Hackett’s work after his death in 1969 and trained the majority of the physicians who practiced the technique over the next 30 years.<sup>30</sup> Hence the designation Hackett-Hemwall dextrose Prolotherapy.

Animal studies have shown that Prolotherapy induces the production of new collagen by stimulating the normal inflammatory reaction.<sup>31, 32</sup> In addition, animal experiments using dextrose Prolotherapy injections at the fibro-osseous junctions have shown measurable increases in ligament and tendon diameter and strength, as evidenced upon post-mortem exam.<sup>33</sup> K. Dean Reeves, MD, has conducted two human studies that showed Prolotherapy has the potential to reverse degenerative arthritis. One of his studies involving 150 finger joints on 27 patients, indicated that after six series of Prolotherapy injections a statistically significant improvement in joint narrowing scores as revealed by X-rays, compared to a placebo, was seen in the dextrose Prolotherapy group one year after treatment.<sup>34, 35</sup> Prolotherapy is commonly taught and used for unresolved hand and finger pain.<sup>36</sup> However, other than Dr. Reeves’ aforementioned study, no other analysis regarding Prolotherapy and hand and finger pain has been done. This observational study was

undertaken to evaluate the effectiveness of Hackett-Hemwall dextrose Prolotherapy in regards to reducing the subjects’ previously unresolved hand and finger pain and stiffness and also its effectiveness in reducing or eliminating their need for pain medications.

## Patients and Methods

### FRAMEWORK AND SETTING

In October 1994, the primary author (R.H.) started a Christian charity medical clinic called Beulah Land Natural Medicine Clinic in an impoverished area in southern Illinois. The primary modality of treated offered was Hackett-Hemwall dextrose Prolotherapy for pain control. Dextrose was selected as the main ingredient in the Prolotherapy solution because it is the most commonly used proliferant in Prolotherapy, is readily available, inexpensive (compared to other proliferants), and has a high safety profile.<sup>37</sup> The clinic met every three months until July 2005. All treatments were given free of charge.

### PATIENTS

Patients who received Prolotherapy for their unresolved hand pain in the years 2002 to 2005 were called by telephone and interviewed by a data collector (D.P.) who had no prior knowledge of Prolotherapy. General inclusion criteria were an age of at least 18 years, having an unresolved hand pain condition that typically responds to Prolotherapy, and a willingness to undergo at least four Prolotherapy sessions, unless the pain remitted with less number of Prolotherapy sessions. Typical hand conditions that respond to Prolotherapy include hand and/or finger osteoarthritis, ligament sprains and tendinopathies.

### INTERVENTIONS

The Hackett-Hemwall technique of Prolotherapy was used. Each patient received 10 to 30 injections of a 15% dextrose, 0.2% lidocaine solution with a total of 15 to 30cc of solution used per hand/finger. Injections were given into and around the areas on the hand/fingers that were painful and/or tender with palpation. The typical spots each injected with 0.5 to 1cc of solution can be seen in *Figures 1a & 1b*. Tender areas injected included the carpometacarpal and metacarpophalangeal joints, proximal and distal interphalangeal joints, as well as



**Figure 1a. Typical injection sites for Hackett-Hemwall Prolotherapy of the hand.**



**Figure 1b. Prolotherapy of the thumb, carpometacarpal joint.**

ligament and tendon attachments around the hands and fingers. (See Figure 2.) As much as the pain would allow, the patients were asked to cut down or stop other pain medications they were taking.

### OUTCOMES

D.P. was the sole person obtaining the patient information during the telephone interviews. The patients were asked a series of questions about their pain and various symptoms before starting Prolotherapy. Their response to Prolotherapy was also detailed with an emphasis on the effect Prolotherapy had on their hand pain, stiffness and medication use. Specifically, patients were asked questions concerning years of pain, pain intensity, stiffness,

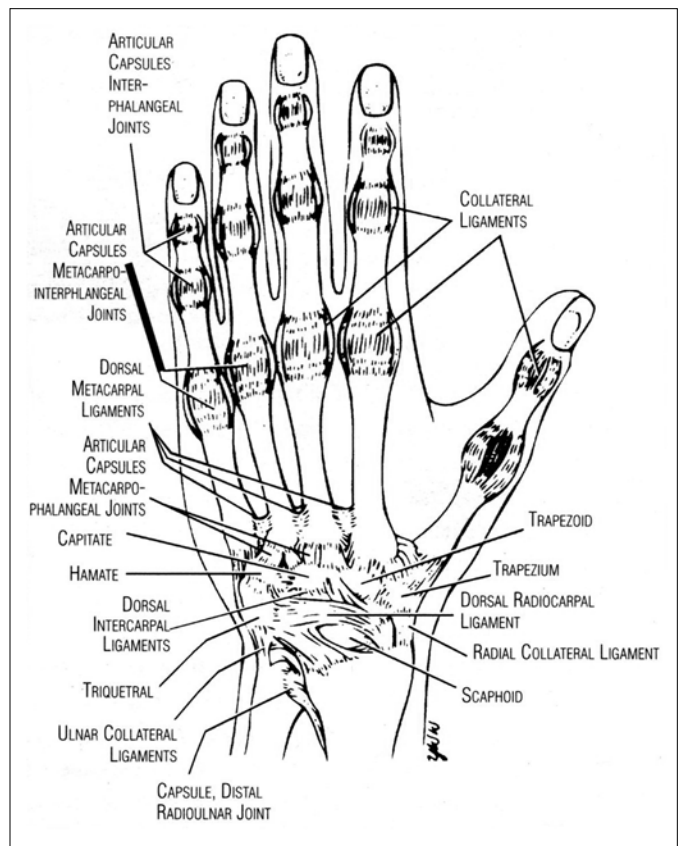
number of physicians seen and medications taken and whether the response to Prolotherapy continued after the Prolotherapy sessions stopped.

### ANALYSIS

For the analysis, patient percentages of the various responses were calculated. These responses gathered from clients before Prolotherapy were then compared with the responses to the same questions after Prolotherapy.

### PATIENT CHARACTERISTICS

Complete data was obtained on a total of 40 hands who met the inclusion criteria. Of these, 75% (30) were female and 25% (10) were male. The average age of the patients was 60 years-old. Patients reported an average of four years seven months of pain and saw 2.8 MD's before receiving Prolotherapy. The average patient was taking 1.0 pain medications. The demographics of the patients can be seen in Table 1.



**Figure 2. Ligaments of the hand, thumb and fingers.**

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Table 1. Patient Characteristics Prior to Prolotherapy.	
Hand patients	n=40
Percentage of female patients	75%
Percentage of male patients	25%
Average age	60
Average years of pain	4.6
Average number of MD's seen	2.8
Average pain medications	1
No other treatment options available	38%
Surgery only other option	7%

TREATMENT OUTCOMES

Patients received an average of 4.5 Prolotherapy treatments per hand/finger. The average time of follow-up after their last Prolotherapy session was eighteen months.

Patients were asked to rate their pain and stiffness levels on a scale of 1 to 10 with 1 being no pain/stiffness and 10 being severe crippling pain/stiffness. The 40 hands had an average starting pain and stiffness level of 5.9 and 5.6 respectively. Their ending pain and stiffness levels were 2.6 and 2.7 respectively. Thirty-five percent had a starting pain level of 8 or greater, while only 10% had a starting pain level of two or less, whereas after Prolotherapy none had a pain level of 8 or greater while 65% had a pain level of two or less. (See Figure 3.)

Ninety-eight percent of patients stated their hand pain was less after Prolotherapy. Over 71% said the improvements in their pain and stiffness since their last Prolotherapy session have continued 100%. Eighty-two percent of patients stated Prolotherapy relieved them of at least 50% of their pain. (See Figure 4.) In regard to pain medication usage, before Prolotherapy the average patient was taking 1.0 pain medications but this decreased to 0.5 medications after Prolotherapy. Before Prolotherapy, 11 patients were taking two or more medications but this decreased to three people after Prolotherapy. Of patients not taking pain medications upon completion of their Prolotherapy series, none reported subsequently restarting pain medication due to hand or finger pain.

To a simple yes or no question: “Has Prolotherapy changed your life for the better?” 95% percent of patients treated answered “Yes.” Seventy-five percent came to receive their first Prolotherapy session on the recommendation of a friend. One hundred percent of these patients have recommended Prolotherapy to someone else.

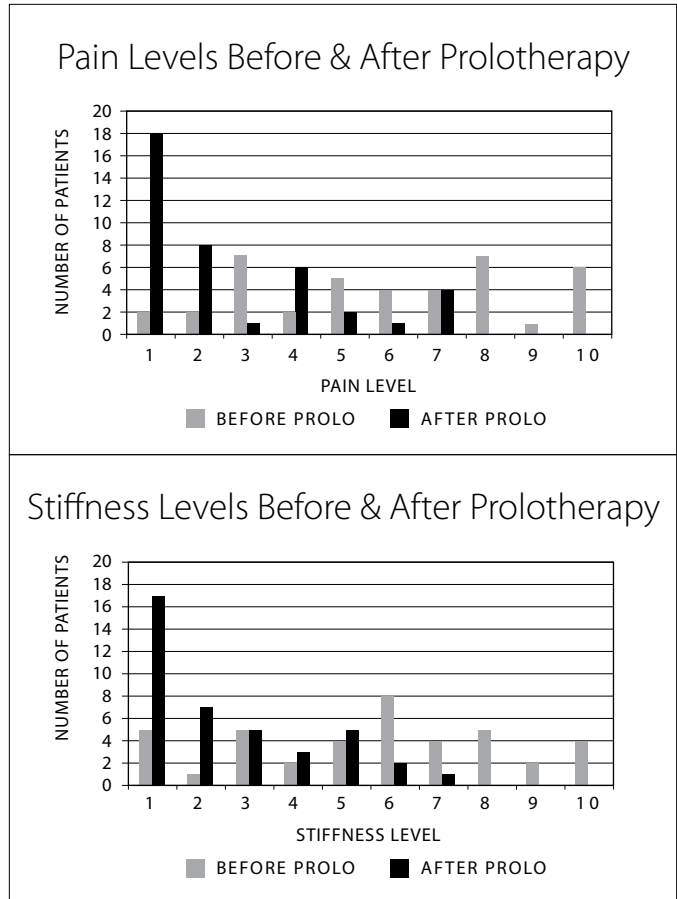


Figure 3. Pain levels and stiffness levels before and after receiving Hackett-Hemwall Prolotherapy in 40 patients with unresolved hand pain.

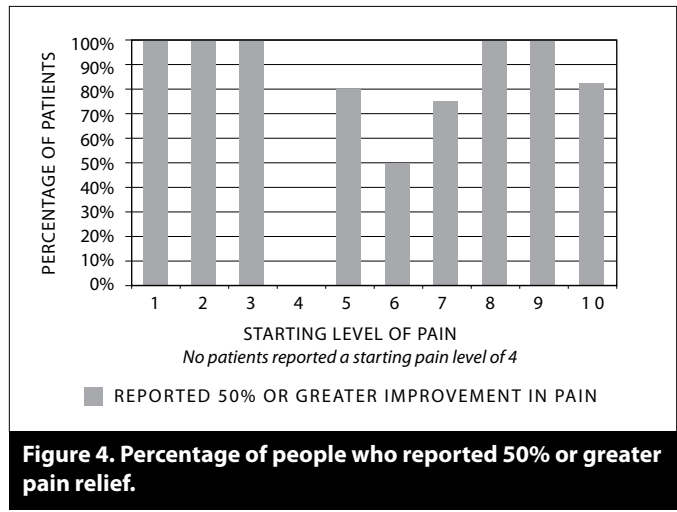


Figure 4. Percentage of people who reported 50% or greater pain relief.

STATISTICAL ANALYSIS

A matched sample paired t-test was used to calculate the difference in responses between the before and after measures for pain and stiffness for the 40 patients. Using

the paired t-test, all p values for pain and stiffness for the two groups reached statistical significance at the  $p < 0.000001$  level or less. (See Table 2.)

**Table 2. Summary of results of Hackett-Hemwall dextrose Prolotherapy hand study.**

Total number of patients	40
Average months of pain	55
Average pain level before Prolotherapy	5.9
Average pain level after Prolotherapy	2.6
Paired t ratio	15.534
P value	$p < .000001$
Average stiffness level before Prolotherapy	5.6
Average stiffness level after Prolotherapy	2.7
Paired t ratio	13.477
P value	$p < .000001$
Greater than 50% pain relief	82%

## Discussion

### PRINCIPLE FINDINGS

The results of this retrospective, uncontrolled observational study show that Prolotherapy helps decrease pain and stiffness in patients with previously unresolved hand/finger pain. The Hackett-Hemwall dextrose Prolotherapy gave 82% of them 50% or more pain relief. Medication use was also lessened after Prolotherapy.

### STRENGTHS AND LIMITATIONS

Our study cannot be compared to a clinical trial in which an intervention is investigated under controlled conditions. Instead, it is intended to document the response of patients with unresolved hand and finger pain and stiffness to Prolotherapy at a charity medical clinic.

The quality of the cases is a strength in this study. The average reported length of pain was four years, seven months. The average patient had seen 2.8 MD's prior to receiving Prolotherapy. Plainly, these represented chronic unresponsive hand and finger pain cases. The only therapy provided for the patients at the clinic was Prolotherapy, which was administered every three months. In private practice, Hackett-Hemwall dextrose Prolotherapy is typically given every four to six weeks. The treating

physician may also assess and recommend additional measures to improve a patient's overall health, such as diet/nutritional intervention, exercise, work/ergonomic changes, changes in medications, and other medical care. Patients are often weaned off anti-inflammatory and opioid medications prior to, or at the start of the treatment series. Since this was a free medical clinic where no additional services were able to be rendered, the results of this study are likely an indication of the lowest level of success with Hackett-Hemwall dextrose Prolotherapy. This makes the results more remarkable. Decrease in pain medication was also documented.

A shortcoming of the study is the subjective nature of the evaluated parameters, including pain and stiffness levels. However, the decrease in medication was documented and objective. An additional limitation of our study is the lack of radiologic (X-ray or MRI) correlation for diagnosis and response to treatment. Further, there was a lack of physical examination documentation to group the patients into various diagnostic categories.

### INTERPRETATION OF FINDINGS

Hackett-Hemwall dextrose Prolotherapy was shown to be very effective in reducing pain and stiffness in this group of patients with unresolved hand and finger pain. Prolotherapy is the injection of a solution for the purpose of tightening and strengthening weak tendons, ligaments or joint capsules. Prolotherapy works by stimulating the body to repair these soft tissue structures. It starts and accelerates the inflammatory healing cascade by which fibroblasts proliferate.<sup>38</sup> Fibroblasts are the cells through which collagen is made and by which ligaments, cartilage, and tendons repair.<sup>39</sup> Prolotherapy has been shown in one double-blinded animal study in a six-week period to increase ligament mass by 44%, ligament thickness by 27% and the ligament-bone junction strength by 28%.<sup>40</sup> In other studies on Prolotherapy, biopsies performed after the completion of Prolotherapy showed statistically significant increases in tendon and ligament collagen fiber and diameter of 60%.<sup>41, 42</sup> This is significant since ligament injury has been implicated as the cause of degenerative osteoarthritis in joints.<sup>43</sup> When a ligament is damaged, stretched, or torn, it can cause joint instability. The joint instability due to the ligament injury/laxity causes uneven stress distribution, which leads to joint degeneration and resulting pain and can help identify those who are predisposed to the development of OA.<sup>44, 45</sup> Although the joints in the hands and fingers are non-

weight bearing, they are very mobile and subject to cartilage breakdown from overuse or excessive force.<sup>46</sup>

As Fleming et al. explain in their article on ligament injuries and osteoarthritis, “The ligament-injured joint is at high risk for osteoarthritis. Current conservative (e.g. rehabilitation) and surgical (e.g. reconstruction) treatment options appear not to reduce osteoarthritis following ligament injury. Mechanical instability is the likely initiator of osteoarthritis in the ligament-injured patient.”<sup>47</sup> The stability of the carpometacarpal joints of the fingers and thumbs depends on the integrity of the articular surfaces of the bones and on the health of the ligaments and muscles attached to them.<sup>48</sup> Without addressing the ligament laxity, sequelae from ligament injury can include chronic pain, chronically unstable or deformed joints.<sup>49</sup>

Current conservative and traditional chronic pain treatments, such as for hand pain, do not work to repair ligament laxity, but generally do temporarily block the pain.<sup>50</sup> Because Prolotherapy corrects underlying ligament physiology and biomechanics, it has the potential not only stop the pain but also the degenerative process.<sup>51</sup> In his study on finger pain, Dr. K. Dean Reeves and associates showed that six series of injections of dextrose Prolotherapy not only caused improvements in pain and range of motion of the fingers, but also statistically significant improvement in joint narrowing score on X-rays compared to placebo.<sup>52</sup> This current study adds to the scientific literature that Prolotherapy helps decrease pain, stiffness, and medication usage for patients suffering with chronic hand and finger pain. More research is needed to see if indeed Prolotherapy can actually reverse the arthritic process.

## CONCLUSIONS

The Hackett-Hemwall technique of dextrose Prolotherapy used on patients who had an average duration of four years, seven months of unresolved hand and finger pain and who were 18 months out from their last Prolotherapy session was shown to cause a statistically significant decline in their pain and stiffness. Since this small retrospective study showed promising results, further studies under more controlled circumstances and with larger patient populations should be done. ■

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