

# COMPARATIVE OF INTRAARTICULAR INJECTION BETWEEN DEXTROSE PROLOTHERAPY VERSUS TRIAMCINOLONE ACETONIDE IN KNEE OSTEOARTHRITIS

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## Abstract

Knee osteoarthritis (OA) is one of the most common cartilage degenerative disorders that is a major problem because it causes chronic pain and disability. Therefore the method of treatment and prevention of old age is a big challenge. The results of Dextrose Prolotherapy compared to Triamcinolone therapy research are still varied. Objective: to compare the effectiveness of Dextrose Prolotherapy and Triamcinolone Acetonide (TA) in the treatment of moderate knee OA. True experimental single blind study, at the Neurology Polyclinic Dr. Saiful Anwar General Hospital Malang for 6 months (July-December 2019). Group I; Dextrose Prolotherapy (15%) intraarticularly injected 3 times every 4 weeks and group II; TA one-time intraarticular injection. The parameters studied were The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Score, Numeric Rating Scale (NRS), and Range of Motion (ROM), weeks 0, 4, 8, 12 and 24. Forty samples consisted of; the 20 samples of the Dextrose Prolotherapy group consisted of; male: female = 2 (10%): 18 (90%), age 62.4 + 7.28, BMI 25.6 + 3.69 kg / m<sup>2</sup>, pain duration 22.35 + 20.10 months, history of physiotherapy 40.27 + 20.79 times. Kellgren–Lawrence osteoarthritis severity grade II; 17 (85%), grade III 3 (15%). TA group; male: female = 5 (25%): 15 (75%), age 62.5 + 9.02, BMI 28.4 + 5.01 kg/m<sup>2</sup>, pain duration 15.95 + 16.55 months, history of physiotherapy 34 + 24.87 times. Kellgren – Lawrence osteoarthritis severity grade II; 18 (90%), grade III; 2 (10%). Comparison of NRS at rest Dextrose Prolotherapy vs TA of week 4 (2.60 vs 1.25), week 8 (1.65 vs 1.40), week 12 (0.8 vs 2.05), week 24 (0.75 vs 3.35). Comparison of NRS during activity Dextrose Prolotherapy vs TA week 4 (4.45 vs 3.35), week 8 (3.25 vs 3.55), week 12 (2.55 vs 4.30), week 24 (2.55 vs 5.80). Comparison of ROM flexion Dextrose Prolotherapy vs TA week 4 (127.05° vs 123.60°), week 8 (130.85° vs 122.95°), week 12 (130.85° vs 122.95°), week 24 (131.05° vs 122.10°). Comparison of WOMAC score Dextrose Prolotherapy vs TA week 4 (30.05 vs 22.45), week 8 (22.90 vs 23.95), week 12 (19.30 vs 29.05), week 24 (18.95 vs 35.40). Intraarticular Injection Dextrose Prolotherapy is more effective for the long term based on pain scale NRS, WOMAC score and ROM. Whereas short-term TA is more effective than Dextrose Prolotherapy.

**Keyword :** Osteoarthritis, Dextrose Prolotherapy, Triamcinolone Acetonide

## INTRODUCTION

Osteoarthritis (OA) is a disease that is needed at an age caused by degenerative processes and recovery in articular subcondral tissue and cartilage resulting in biomechanical changes which ultimately cause pain, stiffness, and replacement of articular function. Knee osteoarthritis is a major problem in the world because it is the second leading cause of joint pain and disability in the elderly in western countries after cardiovascular disease (1,2,3).

Treatment methods for knee OA include non pharmacological, pharmacological and surgical procedures. One therapeutic option that is developing and becoming the choice in the treatment of knee OA is intraarticular injection.

Intraarticular injection of Triamcinolone Acetonide has been recommended as a treatment for knee OA (4,5,6). However, it only provides short term benefits and there are some adverse side effects (7,8,9).

Prolotherapy is known as proliferative therapy or regeneration injection therapy as a treatment for musculoskeletal pain. Prolotherapy with dextrose has been used for the treatment of knee OA for decades and has recently had efficacy from the results that have been studied.

From various previous studies, both injection of Triamcinolone Acetonide and prolotherapy with dextrose in knee osteoarthritis still provide mixed results due to differences in therapeutic methods, evaluation time intervals and therapeutic measurement tools. Because knee OA treatment requires a long time, an alternative non-surgical treatment that is safe, simple,

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inexpensive, effective, and minimal side effects to reduce pain and improve patient function, then one alternative to knee OA treatment is intraarticular injection of Dextrose Prolotherapy.

Because of the varied research results, the emergence of side effects in the use of Triamcinolone Acetonide and the lack of research data on Triamcinolone Acetonide injection therapy and dextrose prolotherapy, in this study the authors examined how to compare the effectiveness of intraarticular injection of Dextrose Prolotherapy with Triamcinolone Acetonide in the treatment of moderate knee OA at Neurology Clinic Dr. Saiful Anwar Hospital Malang.

The hope if it is proven that Dextrose Prolotherapy has a better effect than Triamcinolone Acetonide, it can be included as one of the standard therapies for the knee OA.

## METHOD

### Study Design

This research is a true experimental single blind study to determine differences in the effectiveness of intraarticular injection between Dextrose Prolotherapy and Triamcinolone Acetonide in moderate knee OA patients at Neurology Clinic Dr. Saiful Anwar Hospital Malang.

### Time and Place

The place for this study at the Neurology Clinic of Dr. Saiful Anwar Hospital. Malang within 6 months (July- December 2019).

### Study Population and Sample

The study population was all patients with knee OA at Neurology Clinic Dr. Saiful Anwar Hospital Malang.

The research sample was the study population that met the inclusion and exclusion criteria, the sample was obtained based on purposive sampling as many as 40, divided into 2 groups namely Dextrose Prolotherapy and Triamcinolone Acetonide, each with 20 people

### Study Procedure

In this study, data were entered that included the patient's identity, history taking and physical examination, recorded the NRS form, WOMAC, and ROM measurements on the diseased knee. In the patient, a knee joint is photographed with standard AP / Lateral skyline view genu which will be read by a radiologist. Each patient on prolotherapy received three intraarticular injections at 1-month intervals at 0, 4 and 8 week injections. In this Dextrose Prolotherapy 15% injection using a composition of 4cc 40% dextrose + 5cc WFI and 1cc 2% lidocaine in a 10cc syringe and injected using a 5cc syringe needle. The composition of intraarticular injection with steroids using Triamcinolone Acetonide 40 mg and 1 ml of 1% lidocaine in a 5cc syringe. In the injection of Triamcinolone Acetonide it is only done once.

All examinations are carried out by trained personnel, the results recorded and documented for further analysis.

## RESULT

The Samples totaled 40; 20 people from the Dextrose Prolotherapy group and 20 people from the Triamcinolone Acetonide group. In the Dextrose Prolotherapy group 15%; females 18 (90%) and males 2 (10%), ages 62.4 + 7.28, BMI 25.6 + 3.69 kg/m<sup>2</sup>, pain duration 22.35 + 20.10 months, history of physiotherapy 40.27 + 20.79 times. Kellgren – Lawrence osteoarthritis severity grade II; 17 (85%), grade III; 3 (15%).

In the Triamcinolone Acetonide group; 15 women (75%) and 5 men (25%), age 62.5 + 9.02, BMI 28.4 + 5.01 kg/m<sup>2</sup>, pain duration 15.95 + 16.55 months, physiotherapy history 34 + 24.87 times. Kellgren – Lawrence osteoarthritis severity grade II; 18 (90%), grade III; 2 (10%). Patients will be educated to monitor side effects / complications. Side effects of intraarticular injection procedures both with Triamcinolone Acetonide and Dextrose include allergies, pain at the injection site, hematoma, infection, erythema and changes in skin pigmentation and if there are signs of septic arthritis immediately stopped.

During the treatment, the patient is treated the same, which is undergoing physiotherapy twice a week for 3 months in Medical Rehabilitation and is recommended not to take NSAIDs 3 days before injection and for 10 days post injection because it inhibits the recovery process.

Based on demographic findings, Western Ontario and McMaster Universities arthritis index (WOMAC) scores, knee ROM, NRS at rest and activity were recorded. Patients were evaluated shortly before injection (week 0), weeks 4, 8, 12 and 24.

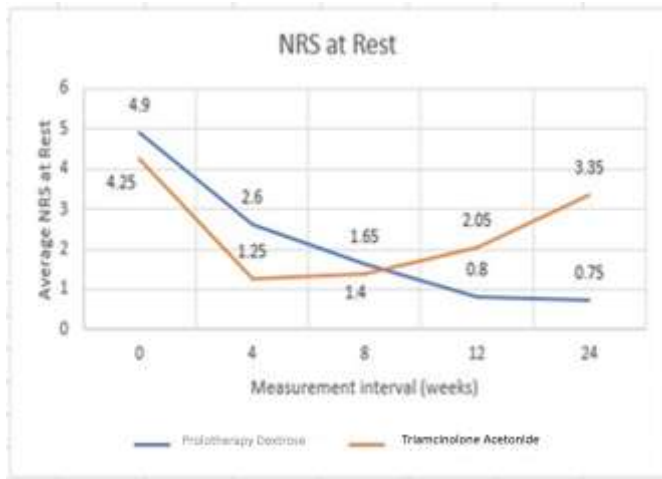
**Table 1.** Comparison Profile of Dextrose Prolotherapy 15% and Triamcinolone Acetonide 40 mg

Characteristics	Dextrose Prolotherapy 15%	Triamcinolone Acetonide 40 mg
Knee	Right 10 (50%) / Left 10 (50%)	Right 14 (70%) / Left 6 (30%)
Age	62.4 ± 7.28	62.5 ± 9.02
Gender	Male 2 (10%) / Female 18 (90%)	Male 5 (25%) / Female 15 (75%)
Profession	Housewives 11 (55%) / Retired civil servants 3 (15%) / Self-employed 2 (10%) / Private 2 (10%) / Teacher 1 (5%) / Civil servants 1 (5%)	Housewife 9 (45%) / Trader 3 (15%) / Retired civil servant 3 (15%) / Self-employed 2 (10%) / Teacher 1 (5%) / Civil servant 1 (5%) / Labor 1 (5%)
Body Mass Index	25.6 ± 3.69	28.4 ± 5.01
< 25	9 (45%)	4 (20%)
26-30	10 (50%)	10 (50%)
>31	1 (5%)	6 (30%)
Duration of Pain (Month)	22.35 ± 20.10	15.95 ± 16.55
History of Physiotherapy (how many times)	40.27 ± 20.79	34 ± 24.87
History of steroid injection or hyaluronic acid	Steroid 1x 9 (45%) / steroid 2x 1 (5%) / steroid 3x 1 (5%) / Never 9 (45%)	Steroid 1x 4 (20%) / Never 16 (80%)
X-ray Kellgren-Lawrence osteoarthritis severity score (I-IV)	2.15 ± 0.37	2.10 ± 0.31
Grade II	17 (85%)	18 (90%)
Grade III	3 (15%)	2 (10%)
Resting numeric rating scale (0-10)	4.8 ± 1.87	4.25 ± 1.65
Activity numeric rating scale (0-10)	7.05 ± 1.85	7.15 ± 1.60
Extension	0.78° ± 2.45°	2.00 ± 5.23
Flexi	128° ± 17.06°	118.25 ± 13.89
Total WOMAC Score (0-96)	41.15 ± 18.23	39.25 ± 14.21
Pain (0-20)	9.3 ± 4.18	8.25 ± 2.84
Stiffness (0-8)	3.5 ± 2.18	3.3 ± 1.98
Physical Function (0-68)	28.35 ± 13.10	27.70 ± 10.24
Random Blood Sugar	118.7 ± 15.94	114.2 ± 18.88

The research parameters used were NRS scores (at rest and activity), WOMAC scores, and ROM evaluated before

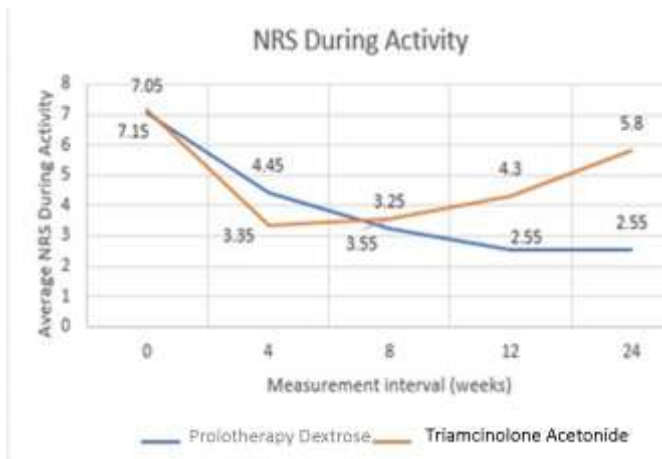
injection (week 0), weeks 4, 8, 12 and 24. The following results are in the form of a comparison chart between Dextrose Prolotherapy and Triamcinolone Acetonide.

**Comparison of NRS at Rest**



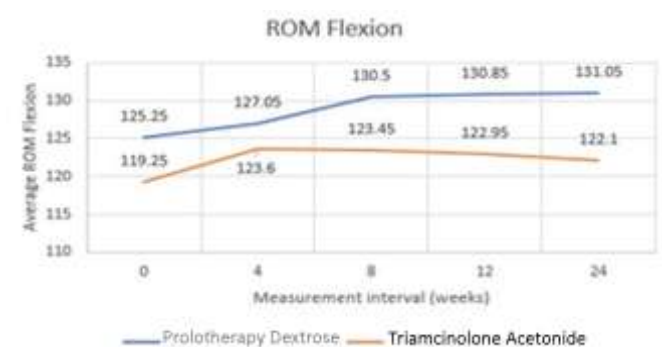
**Figure 1.** Comparison of NRS at Rest Charts between Dextrose Prolotherapy Injection and Triamcinolone Acetonide.

**Comparison of NRS During Activity**

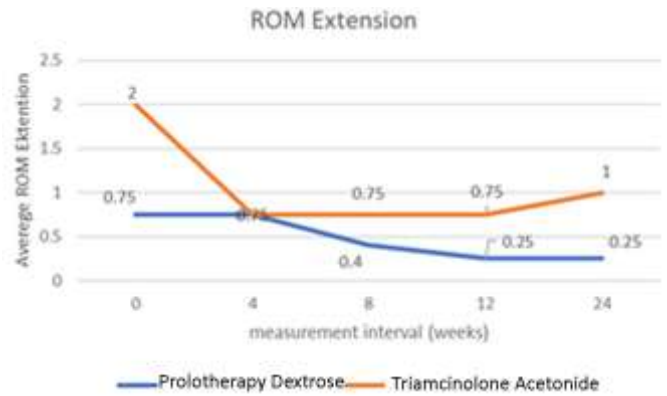


**Figure 2.** Comparison of NRS Activity Charts between Dextrose Prolotherapy Injection and Triamcinolone Acetonide.

**Comparison of ROM Flexion ROM Extension**

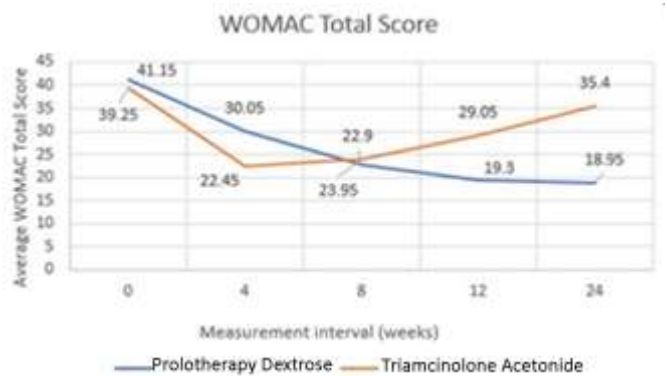


**Figure 3.** Comparison of ROM Flexion Charts between Dextrose Prolotherapy Injection and Triamcinolone Acetonide.



**Figure 4.** Comparison of ROM Extension Charts between Dextrose Prolotherapy Injection and Triamcinolone Acetonide

**Comparison of WOMAC Total Score**



**Figure 5.** Comparison of WOMAC Total Score Chart between Dextrose Prolotherapy Injection and Triamcinolone Acetonide.

**DISCUSSION**

In this study we found evidence of a longer effect to support the use of intraarticular injection of Dextrose Prolotherapy over Triamcinolone Acetonide for the treatment of knee OA in terms of pain relief and function. After 24 weeks of treatment, both injection groups can reduce the severity of symptoms, can increase joint ROM and improve WOMAC score, but Dextrose Prolotherapy seems to be more effective. Our findings are consistent with the results of several previous studies.

Further studies show that the injection of Triamcinolone Acetonide reduces pain sensation and improves function compared to several other treatments for a short time (8).

In another study which confirmed the efficacy of long-term dextrose Prolotherapy which can have an effect of improving pain, stiffness and physical function for 52 weeks on knee OA.(10).

Reeves and Hassanein found that Dextrose Prolotherapy 10% removed significant pain, decreased knee swelling and increased range of knee joint motion. They also found based on radiographic features that prolotherapy with dextrose was associated with improvement in the severity of OA. (11).

In the short term, Triamcinolone Acetonide reduces symptoms quickly, but after a while the manifestations partly recur. In the Dextrose Prolotherapy group reduces symptoms more slowly and continuously, and the effects of treatment tend to persist. The difference is remarkable in 24 weeks

when symptoms are reduced and function is improved more in Dextrose Prolotherapy. Our results show that Triamcinolone Acetonide was initially successful, apparently not as effective as Dextrose Prolotherapy for a longer period of time.

In this study we found that Triamcinolone Acetonide was more effective than Dextrose Prolotherapy at week 4 in terms of reducing NRS pain scores. This is consistent with previous studies that the most significant effect on steroid injection is 1 week after injection and its continued effect can be felt at 3-4 weeks after injection. In accordance with the mechanism that Triamcinolone Acetonide is also included in the short-acting corticosteroid group (12,13,14).

Week 8 between Dextrose Prolotherapy and Triamcinolone Acetonide, the effectiveness of the two is no different. In the 12th week until the end of the study in the 24th week it turns out that Dextrose Prolotherapy is more effective than Triamcinolone Acetonide for reducing pain scores. This is because the effects of Triamcinolone Acetonide have begun to diminish while the effects of prolotherapy are slow and constant until the end of the study.

In terms of total WOMAC scores, both on Dextrose Prolotherapy and Acetonide Triamcinolone the effectiveness is not much different until week 8, but starting from week 12 to week 24 the follow-up on Dextrose Prolotherapy is more effective than Triamcinolone Acetonide. In other words, the effect of treatment reaches its peak after 8-12 weeks, similar to the results of previous studies (15).

The results of this study indicate that intraarticular injection of Dextrose Prolotherapy can be useful as a treatment modality for joint pain OA of the knee. From the point of view of long-term effectiveness, intraarticular injection of Dextrose Prolotherapy can be an adequate pain reliever than an injection of Triamcinolone Acetonide.

Further investigation is needed to evaluate the long-term safety of repeated intraarticular injection with dextrose, adequacy of volume and number of injections, although none of the patients here reported serious side effects.

## CONCLUSION

In the long term, Dextrose Prolotherapy is more effective than Triamcinolone Acetonide in patients with moderate knee OA, whereas Triamcinolone Acetonide is more effective in the short term.

## ACKNOWLEDMENT

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