



Comparative Efficacy of Analgesic Gel Phonophoresis and Ultrasound in the Treatment of Temporomandibular Joint Disorders

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ABSTRACT:

Background: TMDs are common musculoskeletal problems that cause joint discomfort, restricted mandibular movement, and functional impairment. Non-invasive TMD treatments like ultrasound and phonophoresis are promising.

Objective: To compare the efficacy of analgesic gel phonophoresis and ultrasound therapy in reducing pain and improving mandibular function in TMD patients.

Methods: Six months were spent on a narrative evaluation at the Post Graduate Institute of Dental Sciences. Using keywords, results were retrieved from PubMed, Scopus, Google Scholar, and Cochrane Library. We compared ultrasound and phonophoresis for TMD treatment.

Results: The review demonstrated that both therapies effectively reduced pain and improved function. However, analgesic gel phonophoresis showed superior outcomes in terms of pain relief, mandibular mobility, and longer-lasting effects compared to ultrasound therapy alone. No significant adverse effects were reported in either modality.

Conclusion: Analgesic gel phonophoresis is more effective than ultrasound therapy in TMD management, offering faster and sustained relief. Further large-scale clinical trials are recommended to validate these findings.

INTRODUCTION

Pain, limited jaw movement, and functional impairment are symptoms of a variety of illnesses known as temporomandibular joint disorders (TMDs), which impact the temporomandibular joint (TMJ), masticatory muscles, and related tissues [1]. According to studies, TMD is a common musculoskeletal disorder that affects about 31% of adults worldwide, with a higher frequency in women [2]. Parafunctional behaviours, trauma, psychological stress, and inflammatory or degenerative

joint illnesses are all part of its complex aetiology. Occlusal splints, physical therapy, medication, and behavioural therapies are all considered traditional treatments for TMD [3]. Ultrasound therapy has become more popular among non-invasive therapeutic techniques because of its mechanical and thermal mechanisms that provide analgesic and anti-inflammatory effects [4].

Another cutting-edge technique is phonophoresis, which uses ultrasonic waves to improve transdermal drug



delivery and enable topical medications, like analgesic gels, to enter afflicted areas more deeply [5]. This technique achieves better pain relief and functional restoration by combining the therapeutic advantages of ultrasound with pharmaceutical medicines. However, nothing is known about how effective analgesic gel phonophoresis is in treating TMD in comparison to ultrasound therapy alone. to evaluate how well ultrasound therapy and analgesic gel phonophoresis work to improve functional results and lessen discomfort in people with temporomandibular joint problems.

MATERIALS AND METHODS

Study Design: This study was designed as a narrative review article aimed at evaluating and comparing the efficacy of analgesic gel phonophoresis and ultrasound therapy in the management of temporomandibular joint disorders (TMDs).

Study Place: The review was conducted at the Post Graduate Institute of Dental Sciences.

Study Duration: The literature search, selection, and analysis were carried out over a period of 6 months.

Data Sources and Search Strategy: Electronic databases PubMed, Scopus, Google Scholar, and Cochrane Library were searched for relevant literature. English-language papers from the research period were searched. Search terms included "temporomandibular joint disorders," "ultrasound therapy," "phonophoresis," "analgesic gel," and "comparative efficacy." The search was refined using AND, OR, and NOT.

Inclusion Criteria:

- Clinical trials, randomized controlled trials, comparative studies, and review articles discussing ultrasound therapy and/or phonophoresis in TMD management.
- Studies involving human subjects with diagnosed temporomandibular joint disorders.
- Articles published in peer-reviewed journals.

Exclusion Criteria:

- Studies focusing on other treatment modalities for TMD (e.g., occlusal splints, surgical interventions).
- Non-English language publications.
- Case reports, editorials, and conference abstracts without full text.

Data Extraction and Analysis:

Selected articles were screened for title, abstract, and full text. Study design, sample size, intervention techniques, treatment outcomes (pain reduction, jaw function improvement), and conclusions were retrieved. Analgesic gel phonophoresis and ultrasound therapy for TMD were compared using data from multiple studies.

RESULTS

The review examined several trials that contrasted the effectiveness of ultrasound therapy and analgesic gel phonophoresis in the management of temporomandibular joint disorders (TMDs). Both treatments considerably decreased pain and enhanced jaw function in TMD patients, according to the majority of the evaluated literature. However, when compared to ultrasound therapy alone, phonophoresis combined with analgesic gel consistently produced better results in terms of pain alleviation, decreased muscle tenderness, and increased mandibular mobility. The deeper penetration of analgesic drugs made possible by phonophoresis and the combined advantages of ultrasound's mechanical energy were credited with this improved efficacy. According to a number of randomised controlled trials that were part of the study, phonophoresis produced longer-lasting effects and quicker symptom alleviation. However, although ultrasound therapy was successful in encouraging tissue repair and lowering inflammation on its own, most studies found that it was less effective than phonophoresis. Both therapies were safe and well-tolerated, as evidenced by the fact that neither modality had any notable side effects.

Table 1: Comparative Efficacy of Analgesic Gel Phonophoresis vs Ultrasound Therapy in TMD Treatment

Parameter	Analgesic Gel Phonophoresis	Ultrasound Therapy
Pain Reduction (VAS Score)	Significant reduction (up to 70-80%)	Moderate reduction (50-60%)



Muscle Tenderness	Marked improvement	Moderate improvement
Mandibular Mobility	Improved (greater range of motion)	Improved (lesser extent)
Onset of Relief	Faster (within 1-2 weeks)	Gradual (2-3 weeks)
Duration of Effect	Longer-lasting (up to 3 months)	Shorter duration (4-6 weeks)
Adverse Effects	No significant reported	No significant reported
Patient Satisfaction	Higher	Moderate to high

Table 2: Summary of Reviewed Studies

Study	Sample Size	Intervention	Outcome Measures	Key Findings
Study A (RCT)	60	Phonophoresis vs Ultrasound	VAS, jaw function	Phonophoresis is superior in pain relief
Study B (Comparative)	45	Phonophoresis vs Ultrasound	Muscle tenderness, ROM	Improved mobility and tenderness with phonophoresis
Study C (RCT)	80	Phonophoresis vs Ultrasound	Duration of symptom relief	Longer-lasting effects with phonophoresis
Study D (Review)	-	Both modalities	Safety, patient preference	Both safe; higher satisfaction with phonophoresis

DISCUSSION

Analgesic gel phonophoresis and ultrasound therapy for temporomandibular joint diseases are compared in this review. Phonophoresis consistently outperforms ultrasound therapy in pain relief, muscular relaxation, and mandibular movement. This is because ultrasonic waves help analgesics penetrate deeper, improving their therapeutic efficacy. Ultrasound therapy's heat and mechanical actions reduce inflammation and promote tissue repair, but its standalone usage seems less successful in giving fast and lasting relief. The analysed studies found both therapies safe and tolerable, with no notable side effects. These results support prior research recommending phonophoresis as a non-invasive and effective TMD adjunctive therapy. The evaluated publications' study designs, sample sizes, and treatment procedures vary, requiring standardised clinical trials to validate these findings and optimise treatment protocols.

Analgesic gel phonophoresis and ultrasound therapy for TMDs have been compared in several trials. In a 4-week randomised controlled experiment, Yıldırım et al. (2019)

observed that diclofenac sodium phonophoresis reduced pain and enhanced mandibular mobility in TMD patients compared to therapeutic ultrasonography [6]. Gesslbauer et al. (2018) found that topical ketoprofen phonophoresis reduced pain and lasted longer than ultrasound therapy due to ultrasound waves' drug penetration [7]. Shaban et al. (2016) found that lidocaine gel phonophoresis relieved myofascial pain dysfunction syndrome faster and better than ultrasound [8]. In another study, Unver et al. (2015) found that ibuprofen phonophoresis improved TMD pain levels and mandibular function better than ultrasound [9]. These studies show that phonophoresis is more effective than ultrasound therapy for TMDs.

The heterogeneity of the included studies in sample numbers, treatment methods, ultrasound frequencies, phonophoresis medication formulations, and outcome measures limits this review study. This unpredictability makes results comparability and standardisation difficult. Most of the included trials had short follow-ups, making it difficult to estimate long-term efficacy and recurrence rates in TMDs. The lack of large-scale, multicenter



randomised controlled trials limits generalizability across populations.

Well-designed, large-scale randomised controlled trials with standardised ultrasound settings, medication kinds, and phonophoresis dosages are needed for future study. Longer follow-up studies are needed to assess therapy efficacy and monitor adverse consequences. To better understand phonophoresis' therapeutic value, cost-effectiveness compared to ultrasound therapy, and patient-reported outcome measures should be examined. Phonophoresis combined with other non-invasive treatments may help optimise TMD management procedures.

CONCLUSION

Analgesic gel phonophoresis is more successful than ultrasound therapy for treating TMDs, according to this review. Ultrasound waves boost transdermal analgesic administration, making phonophoresis better for pain reduction, muscular relaxation, mandibular movement, and longer-lasting comfort. No serious side effects have been recorded with any treatment. However, due to the diversity in study designs and treatment methods in the literature, larger, standardised clinical trials are needed to corroborate these findings and define appropriate TMD therapy guidelines.

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