

Case report

A novel conservative modality in the management of internal derangement of temporomandibular joint- A case report

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ABSTRACT

Temporomandibular joint internal derangement (TMJ ID) may be managed by conservative means, minimally invasive methods, and/ or surgically. Conservative options include soft diet, pharmacotherapy, splints, physiotherapy, or topical administration of nutraceuticals, for elimination of TMJ ID symptoms. FIXIT is a topical ointment, consisting of plant-based ingredients; its specific components have been successful in treating knee osteoarthritis (OA). However, these have not been applied for TMJ ID conditions (lacuna in literature). The aim of this study is, therefore, to evaluate the effectiveness of FIXIT in TMJ ID management by assessing TMJ pain, clicking sound and pain-free maximum mouth opening (MMO) in an 18-year-old male. The patient complained of right TMJ pain (VAS- 8) on mouth opening, and loud clicking sounds, with pain-free MMO of 19 mm pre-treatment. Post-topical therapy (after 3 weeks) with FIXIT, significant reduction in TMJ pain (VAS- 0) and joint sounds (absent- 0), with improved MMO (47 mm) was noted. No recurrence of symptoms was observed after 3 months of follow-up. FIXIT has been effective in alleviating TMJ ID symptoms, thereby enhancing overall jaw function. Its ability to eliminate clicking sounds was found to be an unprecedented finding; suggesting its novelty as a non-surgical intervention for TMJ ID.

Keywords: Conservative modality; internal derangement; temporomandibular joint; topical intervention.

INTRODUCTION

Temporomandibular joint internal derangement (TMJ ID) is a joint disorder, wherein the disc is slipped from its normal position, in relationship to mandibular condyle, glenoid fossa and articular eminence (1). Management of TMJ ID by conservative measures – external application of topical ointments, creams, or gels, may also be considered, as they are known for its safety and effectiveness, with less reported adverse effects, in contrary to the intra-articular joint injections and oral medications (2). The topical interventions have comprised of varied combinations; either a mixture of NSAIDs with nutraceuticals, or a mixture of multiple nutraceuticals alone. Owing to the inevitable side effects and adverse drug interactions in NSAIDs, treatment for TMJ problems have been shifted to plant-based nutraceuticals, that have been discovered as novel chemical substances, without any systemic effects (3). Hence, in the present study, a topical intervention consisting entirely of nutraceuticals has been chosen in the management of TMJ ID, that is marketed by the trade name, FIXIT.

The unique formula of nutraceuticals in FIXIT are learnt to have minimized symptoms related to osteoarthritis (OA) of the knee, or other joints in the body from previous scientific studies, either as sole components, or in combination with the others. However, there is nil literature evidence regarding their use in reducing TMJ ID symptoms. Thus, it is hypothesized in our study that, FIXIT may be an effective alternative to the conventional conservative treatment options, in reducing TMJ pain, and

improving joint mobility. The aim of this study is to evaluate the effectiveness of FIXIT ointment in the management of TMJ ID, by assessing TMJ pain, joint sounds, and pain-free maximum mouth opening (MMO), in an 18-year-old patient.

CASE HISTORY

An 18-year-old male reported to the Department of Oral and Maxillofacial Surgery with a chief complaint of tightness in his right facial joint for the past 1 year.



Fig. 1: Pain-free maximum mouth opening (19 mm) during the pre-treatment period

The patient gave a history of mouth opening limitation and right facial joint pain, following which he

underwent a procedure for removal of right lower back wisdom tooth nine months back. Post-removal of the third molar, the patient had developed loud clicking sounds on mouth opening. Mouth opening limitation continued on wide mouth opening (yawning, or biting from an apple), which was associated with pain in the right facial joint. Oral medications were prescribed, however, there was no resolution of symptoms. The medical history revealed that the patient is asthmatic since childhood, and had no relevant family, or surgical history. On intra-oral examination, pain-free MMO was observed to be 19 mm, as shown in Fig. 1.

Jaw deviation by 3 mm towards the left side was noted on mouth opening. Other TMJ findings included a pain score of 8 in right TMJ on wide mouth opening. Pain was present in the right TMJ even on protrusive and left lateral excursive movements. Another subjective finding was the presence of joint sounds (loud click) in the right joint, on mouth opening.



Fig.2: Sagittal section of MRI revealing anterior disc displacement in the closed mouth position

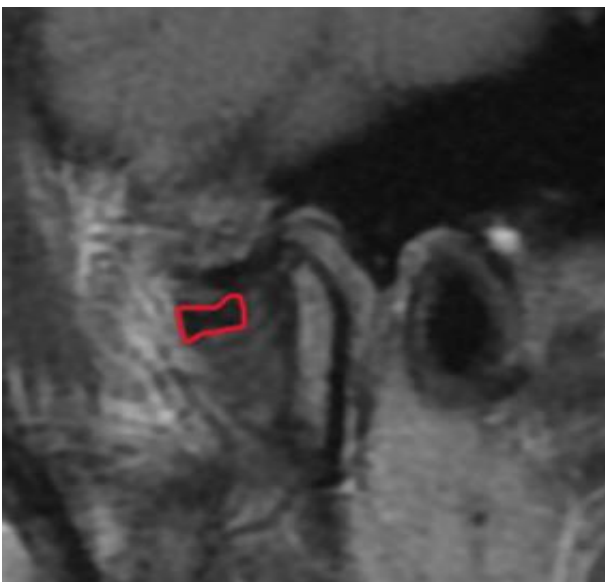


Fig.3: Sagittal section of MRI revealing anterior disc displacement without reduction in the open mouth position

Based on the clinical presentation, a provisional diagnosis of internal derangement (ID) of the right TMJ was made. On MRI, the sagittal section of right TMJ revealed anterior disc displacement in the closed mouth position that was non-reducible in the open mouth position, as shown in Figs. 2 and 3.

Mild degenerative changes were also noted in the right TMJ. These findings were suggestive of anterior articular disc displacement without reduction, confirming the diagnosis of right TMJ ID (Wilkes stage- III). The case was decided to be managed by a conservative treatment modality. A topical ointment was introduced to the patient, that was procured from a GMP Certified Company; Ambrosia Herbals, Delhi. The ointment was an ayurvedic proprietary medicine, manufactured and marketed by the trade name, FIXIT.



Fig. 4: Fixit ointment

Each 10g of FIXIT consisted of natural ingredients; Gandhpura oil (*Gaultheria fragrantissima*) 500 mg, Eranda (*Ricinus communis*) 100 mg, Nirgundi (*Vitex negundo*) 30 mg, Shallaki (*Boswellia serrata*) 20 mg, Haldi (*Curcuma longa*) 20 mg, and Laung oil (*Syzygium aromaticum*) 5 mg, as shown in fig. 4 and table 1. The preservatives included Sodium Benzoate and Phenoxyethanol.

Procedure

Prior to the topical administration of FIXIT, an informed consent was obtained from the patient towards the procedure (SRMU/M&HS/SRMDC/2023/PG/004). The patient was advised to shave the hair present in front of the right ear. A liberal quantity of FIXIT was then applied by the oral and maxillofacial surgeon (OMFS) on the shaved region, to demonstrate to the patient for the first time. The patient was observed for a duration of 15 to 20 minutes in the department, to monitor for skin allergic reactions on the

right facial joint; burning sensation, redness, and itching.

The patient was advised to adhere to the instructions; to apply FIXIT onto a dry skin surface two times daily (morning and night) for a period of three weeks, to locally massage the affected right TMJ after its application, and to perform gradual mouth opening exercises. Patient was also told to report in case of skin allergies or any other discomfort.

The patient was recalled for review every week, until the third week of treatment. The follow-up was done to assess the improvement in TMJ pain, joint clicking sounds, and the maximum mouth opening (MMO) range without pain. TMJ pain was assessed by VAS; on a scale 0–10, the patient was asked to grade the pain score.

Table 1: FIXIT constituents

Oil constituents	Botanical Name	Common Name	QTY.	Mechanism of action
GANDHPURA	<i>Gaultheria fragrantissima</i>	Wintergreen	500 mg	Blocks prostaglandin synthesis → COX 1 & 2 inhibited
ERANDA	<i>Ricinus communis</i>	Castor	100 mg	Flavonoids, Saponin- ↓histamine → ↓Pain & antioxidant activity
NIRGUNDI	<i>Vitex negundo</i>	Five leaved chaste tree	30 mg	Luteolin ↓inflammation → IL NF Kappa B decreased
SHALLAKI	<i>Boswellia serrata</i>	Frankincense	20 mg	Leukotriene synthesis blocked → Inflammation ↓
HALDI	<i>Curcuma longa</i>	Turmeric	20 mg	↓TNF-α, IL-1β, IL 6, and IL-8
LAUNG	<i>Syzygium aromaticum</i>	Clove	5 mg	Blocks TVRP → ↓inflammation

If there was nil pain, it corresponded to a score of 0, and if pain was extremely severe, it corresponded to a score of 10. The presence of clicking was noted to be a subjective symptom; its presence had corresponded to a score of 1, whereas its absence had corresponded to a score of 0. MMO was recorded by a ruler in millimeters, while taking note of the inter-incisal distance; distance measured between maxillary and mandibular central incisor edges.

Post-treatment findings

Post-first week of treatment, VAS value was recorded as 4 (pre-treatment VAS- 8) on wide mouth opening. Clicking sound was persisting, which was heard as a loud, continuous finger-snapping sound. Pain-free MMO was measured to be 30 mm as shown in Fig. 5.

Fig. 5: Measurement of pain-free MMO (30 mm) during the post-treatment period (week 1)



Fig.6: Measurement of pain-free MMO (38 mm) during the post-treatment period (week 2)

At the second week of review, the pain score remained the same as the first week (VAS- 4). However, there was a reduction in intensity of joint sound that was heard as a dull, single click. Besides, the patient had nil pain on left lateral excursive movements that was present until the first week of treatment. Pain-free MMO had also improved significantly to 38 mm as shown in Fig. 6.

Post-third week of FIXIT treatment, VAS value was recorded to be 0 on wide mouth opening (even on yawning). Clicking sound was reported to be absent,

and pain-free MMO was measured to be 47 mm as shown in Fig. 7.

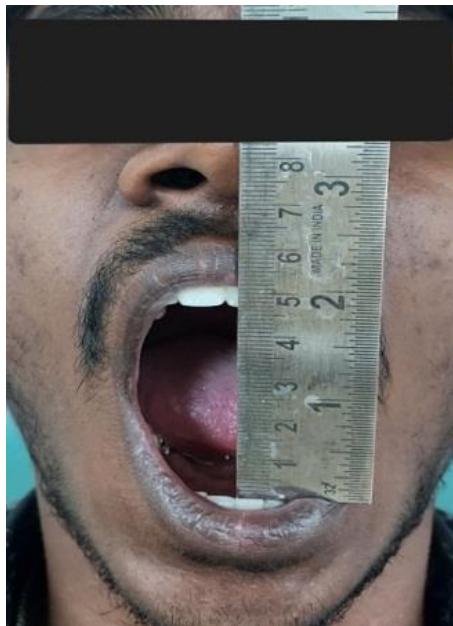


Fig.7: Measurement of pain-free MMO (47 mm) during the post-treatment period (week 3)

On completing the periodic follow-up as depicted in table 2, the patient was encouraged to continue performing mouth opening exercises at a slow pace. Oral medications were not prescribed, and the patient was extremely satisfied with the pain relief that was

solely brought by FIXIT. Besides, the patient returned to normal diet, and no recurrence of pain or clicking sounds was reported after 3 months of FIXIT topical therapy.

Table 2: Patient’s pre- and post-treatment values of TMJ pain, clicking sounds and pain-free MMO assessed at weekly intervals

S. No	Pre- and post-treatment period	TMJ Pain (VAS)	Joint clicking sounds	Maximum pain-free mouth opening (mm)
1.	Pre-treatment	8	Present- (1) Sharp/ loud, continuous click	19 mm
2.	Post-first week	4	Present- (1) Sharp/loud, continuous click	30 mm
3.	Post-second week	4	Present- (1) Dull, single click	38 mm
4.	Post-third week	0	Absent- (0)	47 mm

DISCUSSION

A majority of literature studies have advocated conservative therapy as the first-line treatment option for TMD, which has shown a high success rate in over 90 % of patients (4). With regard to topical formulations, these are a cut above the rest, in terms of safety, patient comfort and tolerability, that offer

enhanced relief from TMJ pain and discomfort. Moreover, when applied over the local vulnerable site, it decreases the side effects associated with the systemic doses (5). The use of topical creams consisting entirely of nutraceuticals are limited in literature, especially concerning TMJ ID management. Hence, this case study was conducted, with the objective of

assessing the effectiveness of a topical ointment (FIXIT) in TMJ ID, based on the clinical parameters; TMJ pain, joint clicking sounds and maximum mouth opening (MMO) without pain.

The post-treatment findings had revealed elimination of right TMJ pain (VAS- 0) and joint sounds (absent- 0), with a significant improvement in MMO score (47 mm), after 3 weeks of FIXIT course. The patient had felt complete elimination of pain after 15-20 minutes of ointment application, that persisted for a duration of 5 hours. When the pain recurred during the day, it was supposedly mild (VAS- 4), that continued until the second-time application for the day. A VAS of 4 that had persisted until the second week, was possibly due to the occurrence of a traumatic event (patient got hit by a tennis ball on the right TMJ). The patient also reported an event of wide mouth opening to eat from a burger, that had further aggravated the joint pain. Since these could have been the etiology for pain persistence, the patient was further advised to abstain from sports activities, along with dietary restrictions during the course of FIXIT treatment. Mouth opening, and overall range of motion (left lateral excursive movements) had also greatly improved. With regard to clicking sounds, complete regression was noted in the right TMJ by the third week.

TMJ clicking sounds are generally associated with anterior disc displacement with reduction (ADDWR), predominantly seen in stage II of Wilkes criteria. These joint sounds point to a number of etiologic factors; abnormality in TMJ structure and its function, deformation of TMJ components, and changes in the quality of synovial fluid. There are however, few cases of disc displacement without reduction (ADDWoR) that are observed with the occurrence of joint clicking sounds (6). Miller et al., had described the probable mechanism behind joint clicking in ADDWoR; the presence of friction between the condyle and posterior band of the anteriorly displaced disc; a single sound is heard during maximum mouth opening (7). In the present study, justification to clicking sound elimination may be attributed to decrease in viscosity of synovial fluid, possibly contributed by anti-inflammatory effect of FIXIT.

Earlier literature studies have documented the efficacy of the topical formulations; Theraflex-TMJ cream, NSAIDs, and indomethacin phonophoresis, that have been instrumental in decreasing pain symptoms of TMD (8). However, there have been safety concerns regarding the chronic application of NSAIDs in literature (9). Theraflex-TMJ (wintergreen oil, copper and zinc polycarboxylate) is known to have produced substantial improvement in muscle pain, compared to the TMJ pain; masticatory muscles revealed a greater reduction in pain when compared to pain in TMJ region during review period (54 % vs. 26%). Therefore, it is superior in treating masticatory muscle pain, and not as effective in the TMJ (10). The effectiveness of

indomethacin phonophoresis was investigated by Ramakrishnan et al., by comparing it with continuous ultrasound without NSAID. It was observed that the latter was more effective in TMJ pain relief (11).

Natural plant-based ingredients with analgesic and anti-inflammatory effects have long been used in the management of TMD symptoms along with standard pharmacologic agents. There is however, a lack of understanding of the mechanism of action, the benefits, the dosage, and the side effects associated with the use of nutraceuticals alone. Ping On ointment, a Chinese herbal topical medication (peppermint oil, menthol, camphor, wintergreen oil, sandalwood oil, eucalyptus oil, bee wax, and aromatic oil) has been used for muscular related conditions; muscle pain, strain and sprain. It has shown profound improvement in TMJ as well as masticatory muscle pain (9). On comparing Ping On with FIXIT, in the former study the recruited patients had TMJ symptoms along with masticatory muscle tenderness, whereas in our study, the patient's chief complaint was localized only to the TMJ region, without any associated muscle pain. Moreover, the joint sounds had persisted after topical application of Ping On, whereas, in the present study, the clicking sound had completely disappeared after FIXIT application. Also, in the Ping On study, as opposed to in the present study, (a) radiological investigations were not carried out for the confirmation of diagnosis (b) there was a lack of pictorial representation of the pre- and post-treatment mouth opening, and, (c) there was no mention about mouth opening exercises and dietary recommendations to patients.

FIXIT is made up of six herbal oils; *Gandhpura*, *Eranda*, *Nirgundi*, *Shallaki*, *Haldi*, and *Laung*. Gandhpura (Wintergreen oil) is a popular medicinal herb that has been employed in the management of several arthritic conditions; muscular rheumatism, tendinitis, cramps, and myositis. Its primary constituent is methyl salicylate, resembling aspirin in its mechanism of action; exerts analgesic and anti-inflammatory effects on topical administration. Owing to the toxic characteristic of wintergreen oil, it is best used topically, as oral intake could lead to side effects such as nausea, vomiting, diarrhea, headache and stomach pain (12).

Eranda (Castor oil) is extracted from the seed *Ricinus communis*, composed of triglycerides; 90 % of fatty acids (ricinoleic acid). It is beneficial in treating arthritis, by reducing inflammation and providing rapid pain relief. Castor oil is used in managing the conditions; chronic backache, sciatica, muscle aches, chronic headache, and rheumatism. It is also known for its anti-tumor, anti-diabetic, anti-oxidant and purgative properties (13,14).

Nirgundi, a volatile aromatic oil, is derived from the leaves of *Vitex negundo*, also known as the three leaf or five leaf chaste tree. Its mechanism of action is carried

out by luteolin, which plays a role in suppressing inflammation, by eliminating the tissues' oxidative stress. It further decreases the production of interleukin- NF kappa B, which subsequently allows the reduction of cyclooxygenase (COX). Its indications are numerous; joint disorders (OA and RA), low backache, sciatica, and ankylosing spondylosis (15).

Shallaki is a derivative of gum-resin extracts of *Boswellia serrata*, commonly used in the management of chronic inflammatory conditions. Their active components include volatile oil, acid resin and gum, which are collectively termed triterpenoids (43 % of boswellic acids). The boswellic acids act by blocking leukotriene synthesis, thereby reducing pain and inflammation without causing gastric symptoms (16).

Haldi/ turmeric (*Curcuma longa*) is an Indo-Asian spice, procured from the ginger family, with widespread use in traditional eastern medicine. Its primary constituent is curcumin that makes up 3-10 % of turmeric powder (bioactive compounds – curcuminoids). The process of anti-inflammation is possible due to the inhibition of pro-inflammatory mediators; TNF- α , IL-1 β , IL 6, and IL-8. Further, a reduction in symptoms associated with OA is ensued (17).

Laung/clove oil (*Syzygium aromaticum*), is considered to be a powerful natural plant, with immense anti-bacterial, anti-oxidant, analgesic, and anesthetic properties. Its main components are eugenol, eugenol acetate, and β -caryophyllene, which offer putative therapeutic effects with minimal adverse reactions. Laung oil promotes anaesthetic and anti-nociceptive activity by inhibiting the transient vanilloid receptor potential (TRPV) (18).

With regard to the topical application of these oils over the TMJ region, Gandhpura oil has been learnt to be one of the components in Ping On, and Theraflex ointment. Anti-inflammatory effects of Haldi in TMJ OA has been shown in a rat study conducted in 2020. Human trials on the topical intervention in TMJ ID, by the use of these natural ingredients have seemed to be nil in literature. There are no scientific reports on the four other constituents, to have studied about their efficacy on topical application for TMJ related symptoms. Therefore, apart from wintergreen oil (Gandhpura), the remaining ingredients have seemed to be absolutely unique in treating TMJ ID in this case study.

Great level of tolerability, patient compliance, less side effects, easy availability, cost-effectiveness, reduced number of clinic appointments and the comfort of applying from home happens to be the positives of FIXIT ointment. The major limitation in this study is the sample size. More randomized controlled trials are to be conducted, with the objective of comparing FIXIT with conventional non-surgical modalities for TMJ ID. Future prospective studies may include more

parameters, to evaluate the noteworthy effects of FIXIT.

CONCLUSION

FIXIT can be considered as an emerging topical intervention, with the potential to effectively manage TMJ ID symptoms. Its novelty relies on the unique oil-containing formulation that is purely plant-based, on its definite ability to specifically treat TMJ ID, with a remarkable ability to eliminate clicking sounds, thereby proving its high standards of intervention.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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