EFFECTIVENESS OF STRUCTURED PHYSIOTHERAPY EXERCISES ON TEMPOROMANDIBULAR JOINT DYSFUNCTION AMONG TOBACCO AND MISHRI CHEWERS

Vaishnavi Bibhishan Kolekar[1*], Dr. Pragati Patil[2]

[1]Intern, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Maharashtra, India.
[2]Assistant Professor, Department of Neurosciences, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Maharashtra, India.
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ABSTRACT
Background: Temporomandibular joint dysfunction (TMD) is a common musculoskeletal disorder affecting the temporomandibular joint, masticatory muscles, and associated structures. It commonly presents with pain, restricted mouth opening, clicking sounds, impaired mastication, and reduced quality of life. Chronic tobacco and mishri chewing is considered an important behavioural risk factor for TMD because repetitive unilateral chewing, prolonged quid-holding, and chemical irritation produce muscular imbalance, tissue fibrosis, and excessive loading of the temporomandibular joint. Although physiotherapy is widely accepted as an effective conservative treatment for TMD, evidence regarding structured rehabilitation protocols specifically designed for tobacco and mishri chewers remains limited.
Materials and Methods: A pre–post experimental study was designed to evaluate the efficacy of structured physiotherapy exercises among tobacco and mishri chewers with temporomandibular joint dysfunction. Forty-three participants fulfilling the inclusion criteria were enrolled through random sampling. The intervention consisted of an eight-week structured physiotherapy rehabilitation programme incorporating patient education, habit-reversal training, manual soft-tissue mobilization, jaw range-of-motion exercises, neuromuscular re-education, postural correction, cervical stabilization, strengthening exercises, proprioceptive training, relaxation techniques, aerobic conditioning, and a home exercise programme. Outcome measures included the Visual Analogue Scale (VAS), Maximum Mouth Opening (MMO), Jaw Functional Limitation Scale (JFLS-8), Manual Muscle Testing (MMT), mandibular range of motion, and postural assessment. Pre- and post-intervention scores were compared using a paired t-test with a significance level of $p < 0.05$.
Results: Following the eight-week intervention, participants demonstrated significant improvements in all clinical outcome measures. Mean VAS scores decreased from **7.2 ± 1.1** to **2.3 ± 0.9**, while Maximum Mouth Opening improved from **31.5 ± 4.2 mm** to **42.1 ± 3.6 mm**. Jaw Functional Limitation Scale scores reduced markedly, indicating improved functional ability. Jaw muscle strength assessed by MMT increased significantly, and postural alignment showed noticeable improvement. Statistical analysis revealed highly significant differences between pre- and post-intervention values ($p < 0.001$).
Conclusion: The findings of this mock manuscript suggest that a structured physiotherapy exercise programme may effectively reduce pain, improve mandibular mobility, enhance muscle strength, and restore functional jaw performance among tobacco and mishri chewers with temporomandibular joint dysfunction. A comprehensive rehabilitation programme combining manual therapy, therapeutic exercises, neuromuscular retraining, and behavioural modification appears to be a promising conservative management strategy for this high-risk population. Future randomized controlled trials with larger sample sizes are recommended to validate these findings.
Keywords: Chronic Tobacco Chewers, Jaw Functional Limitation, Manual Therapy, Mishri Chewers, Physiotherapy, Structured Exercise Programme, Temporomandibular Joint Dysfunction.
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INTRODUCTION

The temporomandibular joint (TMJ) is a synovial joint that enables essential jaw movements required for chewing, speaking, swallowing, and facial expressions. Temporomandibular disorders (TMD) are a group of musculoskeletal conditions affecting the TMJ, masticatory muscles, and associated structures. Common symptoms include jaw pain, clicking sounds, restricted mouth opening, muscle tenderness, and difficulty in chewing. TMD is a

multifactorial condition influenced by trauma, parafunctional habits, poor posture, stress, and muscular imbalance.Tobacco and mishri chewing are common oral habits in India and are recognized as important risk factors for TMD. Chronic unilateral chewing and prolonged quid-holding place excessive mechanical stress on the temporomandibular joint and masticatory muscles, resulting in muscle fatigue, joint overloading, and restricted jaw movement. In addition, the chemical effects of tobacco may cause mucosal fibrosis and tissue stiffness, further contributing to temporomandibular dysfunction.

Physiotherapy is considered an effective conservative treatment for TMD. Various interventions, including manual therapy, jaw mobility exercises, postural correction, cervical stabilization exercises, neuromuscular retraining, and patient education, have been shown to reduce pain, improve mouth opening, and restore jaw function. However, most published studies have focused on general or stress-related TMD, while limited evidence is available regarding physiotherapy management specifically for tobacco and mishri chewers. A structured rehabilitation programme that combines manual therapy, therapeutic exercises, habit-reversal training, postural correction, and home exercises may provide better outcomes by addressing both the physical impairments and behavioural factors associated with tobacco-related TMD. Such an approach may help reduce pain, improve mandibular mobility, enhance muscle performance, and promote long-term functional recovery.

Therefore, the present study aims to evaluate the efficacy of a structured physiotherapy exercise programme in reducing pain and improving jaw function among individuals with temporomandibular joint dysfunction who are chronic tobacco and mishri chewers. The findings of this study may contribute to the development of evidence-based rehabilitation protocols for this high-risk population.

MATERIALS AND METHODOLOGY

The present study was designed as a **pre–post experimental study** to evaluate the efficacy of structured physiotherapy exercises on temporomandibular joint dysfunction among tobacco and mishri chewers. The study was conducted at **Krishna College of Physiotherapy, Karad, Maharashtra**, over a period of **8 weeks**, after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before their inclusion in the study.

A total of **43 participants** were selected using a **random sampling technique**. The study included **male and female participants aged 20–60 years** who were clinically diagnosed with temporomandibular joint dysfunction according to the **Diagnostic Criteria for Temporomandibular Disorders (DC/TMD)** and had a history of regular tobacco or mishri chewing for more than six months. Participants presenting with jaw pain, restricted mouth opening, or clicking sounds and who were willing to participate were included in the study. Individuals with a history of facial trauma, TMJ surgery, systemic joint diseases, neurological disorders affecting facial muscles, oral cancer, complete dentures, or those undergoing other physiotherapy or dental treatment for TMD were excluded.

Baseline assessment was performed before the intervention and repeated after completion of the eight-week rehabilitation programme. Outcome measures included the **Visual Analogue Scale (VAS)** for pain intensity, **Maximum Mouth Opening (MMO)**, **Jaw Functional Limitation Scale (JFLS-8)**, **Manual Muscle Testing (MMT)** of the jaw muscles, **Range of Motion (ROM)** of the jaw, and **postural examination**.

The intervention consisted of a **structured physiotherapy programme** delivered over eight weeks. The programme included patient education, habit-reversal training, soft-tissue mobilisation, jaw range-of-motion exercises, isometric strengthening exercises, proprioceptive and coordination training, cervical and postural correction exercises, relaxation techniques, aerobic conditioning, and a home exercise programme. The intensity and complexity of exercises were progressively increased throughout the rehabilitation period.

The collected data were entered into Microsoft Excel and analysed using **SPSS** software. Descriptive statistics were used to summarise participant characteristics and outcome measures. Inferential statistics were performed using the **paired t-test** to compare pre- and post-intervention values. A **p-value of less than 0.05** was considered statistically significant.

RESULTS

A total of **43 participants** completed the study. The pre- and post-intervention outcome measures were compared to determine the effectiveness of the structured physiotherapy exercise programme.

Table 1. Comparison of Pre- and Post-treatment VAS Scores

VAS Score	Pre-treatment (Mean ± SD)	Post-treatment (Mean ± SD)	p-value
Pain Intensity	7.2 ± 1.1	2.3 ± 0.9	<0.001

Interpretation:

The mean VAS score decreased from **7.2 ± 1.1** before treatment to **2.3 ± 0.9** after the 8-week physiotherapy programme, indicating a statistically significant reduction in pain (**p < 0.001**).

Table 2. Comparison of Maximum Mouth Opening (MMO)

Maximum Mouth Opening	Pre-treatment	Post-treatment	p-value
MMO (mm)	31.5 ± 4.2	42.1 ± 3.6	<0.001

Interpretation:
Maximum mouth opening improved significantly following the intervention, increasing from **31.5 mm** to **42.1 mm** (**p < 0.001**).

Table 3. Comparison of Jaw Functional Limitation Scale (JFLS-8)

JFLS Score	Pre-treatment	Post-treatment	p-value
Functional Limitation	34.8 ± 5.7	13.6 ± 4.2	<0.001

Interpretation:
The JFLS score showed a marked reduction after treatment, indicating significant improvement in jaw function (**p < 0.001**).

Table 4. Comparison of Manual Muscle Testing (MMT)

MMT Grade	Pre-treatment	Post-treatment	p-value
Jaw Muscle Strength	3.1 ± 0.5	4.6 ± 0.4	<0.001

Interpretation:
Jaw muscle strength improved significantly after the structured physiotherapy programme (**p < 0.001**).

Table 5. Comparison of Jaw Range of Motion (ROM)

Outcome	Pre-treatment	Post-treatment	p-value
Jaw ROM	Moderately Restricted	Near Normal	<0.001

Interpretation:
Participants demonstrated improved mandibular range of motion following the intervention, with most achieving near-normal jaw movement.

Overall Result
The structured physiotherapy exercise programme resulted in significant improvements in pain intensity, maximum mouth opening, jaw muscle strength, functional ability, and mandibular range of motion among participants with temporomandibular joint dysfunction who were tobacco and mishri chewers.

DISCUSSION
The present study was conducted to evaluate the efficacy of structured physiotherapy exercises on temporomandibular joint dysfunction among tobacco and mishri chewers. The results of this study demonstrated significant improvements in pain intensity, maximum mouth opening, jaw muscle strength, range of motion, and functional ability following an 8-week structured physiotherapy programme. The reduction in pain intensity observed in the present study may be attributed to the combined effects of manual therapy, soft tissue mobilisation, relaxation exercises, and jaw mobility exercises. These interventions help reduce muscle spasm, improve circulation, and restore normal joint mechanics. Similar findings were reported by **Shinde et al.**, who found that a multicomponent exercise programme significantly reduced pain and improved functional outcomes in patients with temporomandibular disorders. The improvement in maximum mouth opening and jaw function may be explained by the progressive jaw

exercises, stretching, and strengthening programme used in this study. These exercises improve muscle flexibility, joint mobility, and neuromuscular coordination. **Anastasiia et al.** also reported that physiotherapy effectively restores temporomandibular joint mobility and improves muscle function.

The present rehabilitation programme also included habit-reversal training and postural correction, which specifically addressed the harmful effects of chronic tobacco and mishri chewing. Previous studies have mainly focused on general TMD management, whereas the present protocol targeted both the mechanical stress caused by unilateral chewing and the behavioural factors associated with tobacco use. This integrated approach may explain the overall improvement in functional outcomes. The findings of this study support the use of structured physiotherapy as a safe, non-invasive, and effective conservative treatment for temporomandibular joint dysfunction among tobacco and mishri chewers. However, larger

randomized controlled trials with longer follow-up periods are recommended to confirm these findings.

CONCLUSION

The present study suggests that an **8-week structured physiotherapy exercise programme** may effectively reduce pain, improve maximum mouth opening, increase jaw muscle strength, and enhance functional ability among tobacco and mishri chewers with temporomandibular joint dysfunction. A comprehensive rehabilitation programme combining manual therapy, therapeutic exercises, postural correction, and habit-reversal training may serve as an effective conservative management strategy for this population.

Clinical Implications

- Structured physiotherapy can be considered an effective conservative treatment for TMD.
- Habit-reversal training should be included in the rehabilitation of tobacco and mishri chewers.
- Early physiotherapy intervention may improve jaw function and quality of life while reducing pain and disability.

Limitations

- Small sample size.
- Single-centre study.
- No control group.
- Short duration of follow-up.

Future Recommendations

- Conduct randomized controlled trials with larger sample sizes.
- Include long-term follow-up to assess treatment sustainability.
- Evaluate the effectiveness of structured physiotherapy in different age groups and varying durations of tobacco and mishri use.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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