

A Literature Review to Analyze the Effectiveness of Physiotherapy in Trismus Following Radiotherapy

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Abstract: *Background:* Trismus in oral cancer is defined as a tonic contraction of the muscles of mastication resulting from any abnormal condition or disease with a mouth opening of ≤ 35 mm. Trismus (lockjaw) is a prolonged tetanic spasm of the jaw muscles. Prevalence of Trismus is very high (81 %) in patients undergoing radiotherapy secondary to Head & Neck cancer. *Aim:* To review the effectiveness of physiotherapy management in Trismus in Head and Neck Cancer following radiotherapy. *Search Method:* PubMed, Google Scholar, Research Gate, and Science Direct from these database articles were searched. Articles from 2012 - 2021 have been taken. *Selection Criteria:* Selection criteria include the articles focusing on Trismus in head and neck cancer following radiotherapy. *Result:* Out of 15 articles, 5 show that mouth - opening devices (therabite, Dynasplint, Tongue depressor) are effective in improving mouth opening. 2 articles show that low - level ultrasound and exercise therapy were more effective than low - level laser therapy along with exercise therapy in treating trismus. 8 articles show that exercise therapy is beneficial in treating trismus. Some articles show that exercise therapy should be started immediate after surgery or radiotherapy showed fewer complications of trismus. *Conclusion:* This literature review analyzed the effect of physiotherapy management for trismus. It can be the choice of treatment for trismus conditions.

Keywords: Physiotherapy management, Postradiotherapy, Radiotherapy - induced trismus, Trismus

1. Introduction

Head and neck cancer is the sixth most common malignancy worldwide.¹ Men are twice as likely to get head and neck cancers (HNC), a heterogeneous collection of tumors that begin in the oral cavity, oropharynx, hypopharynx, and larynx. Since the end of the 20th century, there has been a major improvement in HNC; the relative 5 - year survival rate is 65% for all HNC and up to 84% for local malignancies. Even though survival rates have increased, pterygoid or masseter muscle scarring after surgery and radiotherapy - induced fibrosis in the TMJ can have negative effects on mouth opening, voice, speech, and swallowing.²

Radiotherapy/ Chemotherapy: Because oral mucosal cells mature quickly, they are susceptible to the toxic side effects of chemotherapy, which can result in stomatitis. The dose is inversely correlated with the severity of the stomatitis. Although the damage is repairable, this illness can still lead to significant pain, anguish, trismus, and swallowing issues. Normal tissue and function are preserved, which is the fundamental advantage of using radiotherapy to treat oral cancer. However, problems can occur depending on which healthy tissues are in the radiation beam's path, how much radiation is administered, and how long the treatment is given. Osteoradionecrosis symptoms include pain, trismus, suppuration, and a wound that smells bad. Radiation - induced fibrosis, which can cause trismus and a loss of function, can affect the masticatory muscles. Fibrosis and trismus have been connected to endarteritis obliterans - induced ischemia. Dental care following radiation is more challenging when there is a trismus.³

Trismus is a disorder that affects how much the mouth can expand, which has an immediate impact on daily activities like chewing, swallowing, speaking, and maintaining oral hygiene. By causing malnutrition, weight loss, and

difficulties undergoing dental procedures, it contributes to tooth decay. The inability to open the mouth is a typical symptom of head and neck cancer patients. It either results from the tumor or from H&N cancer surgery and radiotherapy side effects. As a result of the inflammatory process and subsequent discomfort, trismus appears in HNC survivors. According to a thorough review, the prevalence of trismus was reported to be 17% at baseline, 44% at 6 months following radiation, and 32% at 3 to 10 years. In cases where the mouth opening is less than 35mm, trismus is strongly established. After undergoing surgery for head and neck cancer, patients have limited mouth opening because of the growth of scar tissue in the mastication muscles. This syndrome's hypomobility results in connective tissue rigidity and musculoskeletal deterioration.

Trismus develops in 38% to 42% of people with head and neck cancer, according to recent studies.⁴ Trismus is extremely common (81%) in individuals receiving radiation for head and neck cancer.

Physiotherapy for trismus attempts to lessen discomfort, lessen swelling, soften and mobilize scar tissue, strengthen the mastication muscle, and increase the range of motion in the joints. To measure the mouth opening, wooden tongue depressors from the Therabite Jaw Motion Rehabilitation System are utilized.⁵

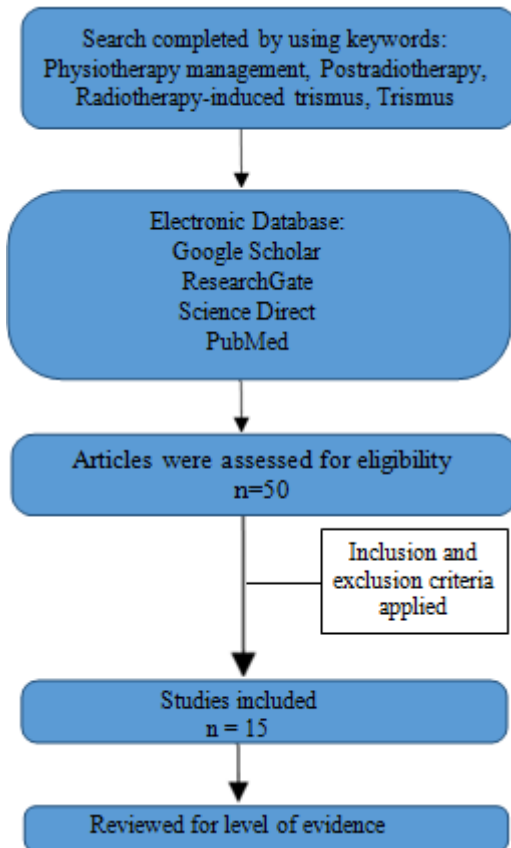
2. Objectives

The objective of the study is to find the effectiveness of physiotherapy management in Trismus in head and neck cancer post - radiotherapy.

3. Materials and Methods

Literature Search Methodology

Online search engines that are used to collect journals are Google Scholar, ResearchGate, Science Direct, and PubMed. The articles were collected in full text. A total of 50 articles were identified, out of which 15 articles were selected for review.



Inclusion Criteria:

- 1) Articles discussing the effectiveness of physiotherapy management in trismus following Head & Neck cancer after radiotherapy were included.
- 2) Articles about Head and Neck cancer patients following radiotherapy were included.
- 3) Articles in which trismus patients have undergone Radiotherapy who were having Head & Neck cancer were included.
- 4) Articles from the past 10 years were taken.
- 5) Articles that are in the English language were taken.

Exclusion Criteria:

- 1) Articles about Trismus through other factors like Infection, Trauma, Dental treatment, Temporomandibular joint disorders, Tumors and oral care, Drugs, Congenital problems, and Miscellaneous disorders rather than Head and Neck cancer were excluded.
- 2) Articles in which patients took other treatments for Head and Neck cancer like surgery rather than Radiotherapy were excluded.
- 3) Articles from more than 10 years old were excluded.
- 4) Articles in other languages except English were excluded.

4. Review of Literature

No	Author's Name	Year of Publication	Title	Type of Study	Sample Size	Duration	Result/Conclusion
1	Shuzhen Chee et al., ⁶	2021	Intervention for Trismus in Head and Neck Cancer Patients: A Systematic Review of Randomized Controlled Trials	Systematic Review	11 articles	—	Low - level laser therapy and low - intensity ultrasound along with exercises may be beneficial
2	Ove Karlsson et al., ⁷	2020	Jaw exercise therapy for the treatment of trismus in head and neck Cancer: a prospective three - year follow - up study	Prospective study	50 samples	10 weeks	Jaw exercise therapy resulted in increased maximal interincisal (MIO), less trismus - related symptoms, and improved health - related quality of LIFE
3	Yousef E. Ezzat et al., ⁸	2020	The role of exercise therapy in managing post - radiotherapy trismus in head and neck cancer	Case study	1 sample	6 weeks	Therabite Jaw Motion Rehabilitation System and wooden tongue depressor help to increase mouth opening if used together and alternatively
4	Dwight Baldoman et al., ⁹	2018	Physical Therapy Challenges in Head and Neck Cancer	Clinical research study	—	—	The core of RIT (Radiotherapy induced trismus) management is exercise therapy. It must start soon after the radiotherapy is over in order for it to be effective. Exercises have been shown to be the most successful method for raising MID when used in conjunction with jaw - mobilizing gadgets. With a jaw - mobilizing device, patients can increase their mouth opening the most

							over the first four weeks. The effectiveness of treatment is also increased by manual therapies such as masticatory muscle stretching and massage, temporomandibular/cervical joint mobilisation, and myofascial release to the neck musculature.
5	Hany Mohamed Elgohary et al., ¹⁰	2018	Effect of Ultrasound, Laser, and Exercises on Temporomandibular Joint pain and Trismus Following Head and Neck Cancer	Randomized clinical trial	60 samples	4 weeks	The low - intensity ultrasound (LIUS) and traditional exercise therapy (TET) are more effective than low - level laser therapy (LLL) and/or traditional exercise therapy (TET) in reducing TMJ pain and trismus following head and neck cancer
6	Yu - Hsuan Li et al., ¹¹	2018	Mouth - opening device as a treatment modality in trismus patients with head and neck cancer and oral submucous fibrosis: a prospective study	Prospective study	60 samples	12 weeks	Open - mouth exercise device showed improvement in average mouth - opening range, health - related quality of life, and reduction in trismus symptoms
7	Nina Pauli et al., ¹²	2016	Exercise intervention for the treatment of trismus in head and neck cancer – a prospective two - year follow - up study	Prospective study	50 samples	10 weeks	The intervention group has a high MIO compared to the controlled group the intervention group also reported fewer jaw - related problems in two years of follow - ups than the controlled group.
8	Padmanidhi Agarwal et al., ¹³	2016	Trismus in oral cancer patients undergoing surgery and radiotherapy	observational study	30 samples	—	Patients who had taken physiotherapy after radiotherapy treatment showed significant improvement instead to people who had not taken physiotherapy
9	Rapidis, A. D. et al., ¹⁴	2015	Trismus in patients with head and neck cancer: etiopathogenesis, diagnosis, and management	Clinical research study	—	—	Physiotherapy is effective in treating trismus and exercises should be started as soon after surgery or radiotherapy
10	Anne Scherpenhuizen et al., ¹⁵	2015	The effect of exercise therapy in head and neck cancer patients in the treatment of radiotherapy - induced trismus: A systemic review	systemic review	5 articles	—	Exercise therapy showed a positive effect on trismus
11	Jolanda I. Kamstra et al., ¹⁶	2015	Exercise therapy for trismus secondary to head and neck cancer: A systemic review	A systemic review	20 articles	—	Changes in mouth opening ranged considerably and no stretching technique was superior to others regarding either prevention or treatment of trismus
12	Nina Paul et al., ¹⁷	2014	Treating trismus: A prospective study on effect and compliance to jaw exercise therapy in head and neck cancer	prospective study	50 samples	10 weeks	Jaw exercise therapy effectively improved mouth - opening capacity and led to fewer trismus - related symptoms. Also, both jaw devices were proven efficient and compliance to exercise was comparable
13	Nina Pauli et al., ¹⁸	2013	Exercise intervention for the treatment of trismus in head and neck cancer	Randomized clinical trial	50 samples	10 weeks	The structured jaw exercise program was effective and improved the mouth - opening capacity. Also, improvement in health - related quality of life and fewer trismus - related Symptoms.
14	Jolanda I. Kamstra et al., ¹⁹	2012	TheraBite exercises to treat trismus secondary to head and neck cancer	Experimental study	69 samples	6 weeks	Therabite showed a significant improvement in mouth opening and it may change if the time taken to start exercise after oncological treatment lengthens.
15	Joel B. Epstein et al., ²⁰	2012	Oral Complications of Cancer and Cancer Therapy	Clinical research study	—	—	Using devices like tongue depressors that apply resistance to the jaw during exercise will prevent trismus and increase the range of motion in the early stage.

5. Discussion

This study explains the effectiveness of physiotherapy management in treating trismus with head and neck cancer patients who had undergone radiotherapy treatment.

Karlsson et al.⁷, Ezzat et al.⁸, and Baldoman et al.⁹ agree on the potential effectiveness of exercise therapy in the management of trismus in patients with head and neck cancer who have undergone radiotherapy, they differ in their

approaches. Karlsson et al. specifically evaluated the use of jaw exercise therapy, while Ezzat et al. discuss exercise therapy more broadly. Baldoman et al. discuss the challenges of physical therapy in general and emphasize the importance of early intervention.

A study by Pauli et al.¹² is a prospective two - year follow - up study that investigates the effectiveness of an exercise intervention for the treatment of trismus in head and neck cancer patients. The study found that exercise intervention could significantly improve the trismus symptoms in the patients and the effects could last up to two years after the intervention. On the other hand, a study by Rapidis et al.¹⁴ is a review article that discusses the etiopathogenesis, diagnosis, and management of trismus in head and neck cancer patients. The article provides a comprehensive overview of the causes, symptoms, and various treatment options available for trismus.

Studies by Yu - Hsuan Li et al.¹¹, Nina Paul et al.¹⁶, Jolanda I. Kamstra et al.¹⁸, and Joel B. Epstein et al.¹⁹ suggested that mouth - opening devices such as Thera bite, and tongue depressor play a major role in the improvement of mouth opening ability.

Studies by Chee et al.⁶ and Elgohary et al.¹⁰ suggested that exercise therapy along with low - level laser therapy is more effective than only exercise therapy treatment. Ultrasound, laser and exercise interventions were effective in reducing TMJ pain and improving mouth opening, with ultrasound being the most effective.¹⁰

Studies by Dhanrajani et al.³, Agarwal et al.¹³, and Scherpenhuizen et al.¹⁵ suggested that physiotherapy treatment started soon after radiotherapy showed more improvement in reducing the symptoms of trismus. Overall, while these articles provide different perspectives on trismus, they collectively highlight the importance of early diagnosis and appropriate management of this condition, particularly in the context of head and neck cancer treatment.

A study by Pauli et al.¹⁷ found that trismus can have a significant impact on the quality of life for these patients, affecting their ability to eat, speak, and perform daily activities. By improving mouth opening, jaw exercise therapy may help to alleviate these difficulties and improve patient outcomes.

6. Results

Out of 15 articles, 5 showed that mouth - opening devices (therabite, Dynasplint, Tongue depressor) are effective in improving mouth opening. 2 articles show that low - level ultrasound and exercise therapy are more effective than low - level laser therapy along with exercise therapy in treating trismus. 8 articles show that exercise therapy is beneficial in treating trismus. Some articles show that exercise therapy should be started as soon after surgery or radiotherapy shows fewer complications of trismus. The LIUS and TET are more effective than LLLT and/or TET in reducing TMJ pain and trismus following HNC.

7. Conclusion

This literature review analyzed the effect of physiotherapy management for trismus. It can be the choice of treatment for trismus conditions.

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