

Prevalence of trismus in head, neck and face (HNF) cancer patients undergoing radiotherapy: A cross-sectional study

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ABSTRACT

Background: Trismus is a restricted mouth opening due to the tonic contraction of muscles of mastication. It may occur mostly in HNF cancer patients undergoing radiation therapy treatment. This study was undertaken with the purpose of finding out the prevalence of trismus in patients undergoing radiation therapy. **Method:** 89 patients with HNF cancer patients receiving radiation therapy were included in the study. Inter incisal distance was measured using sliding digital vernier calliper. Patients with ≥ 35 mm mouth opening were considered as trismus cases. **Result:** Out of 89 patients included 72 were diagnosed as trismus; hence the prevalence was 81%. **Conclusion:** Prevalence of Trismus is very high (81%) in patients undergoing radiotherapy secondary to HNF cancer. Early diagnosis of trismus in these patients can help in time management and also planning of preventive strategies.

KEYWORDS: Trismus; Prevalence; HNF cancer; Radiation therapy.

INTRODUCTION

Oral cancer is becoming a global health concern. It accounts for over 30% of all cancers in India, with a rate of 20 per 100,000 population [1]. These sites, including are oral cavity, pharynx, and larynx, as well as the nasal cavity and sinuses. Oropharyngeal cancer (OPC) is a rare cancer overall but common in the head and neck region [2]. Radiation and surgery can damage tissues and structures that are critical for jaw range of motion, such as the temporal mandibular joint, muscles of mastication, and the mucosa of the oropharyngeal cavity[10]. A wide variety in the prevalence of trismus is ranging from 5% to 65% [3]. Trismus is one of the most frequent complications in HNF cancer patients undergoing radiotherapy[1]. Trismus is a restricted mouth opening in HNF cancer patients, which previously has not been paid much attention [1]. The prevalence of trismus is

measured by the inter-incisor distance has been reported [4]. 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[1].

The most common risk factors of trismus are large tumour size, high radiotherapy dosage, and tumour location, especially when located close to the muscles of mastication and the temporomandibular joint etc.[5].

The most common cause of oncology-related trismus is radiation-induced fibrosis, while post-surgical scarring may also play a role[5]. The prevalence of trismus was calculated using the cutoff point of an MMO of 35 mm or less[6]. As trismus may result from a lesion within the mouth cavity, malignant diseases adjacent to the mouth cavity may cause trismus[6]. The normal range of mouth opening range in males is 39mm to 70mm and in females 36mm to 56mm

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of Indian population[7]. Gradual classification for trismus such as mouth opening >30 mm indicate light trismus, mouth opening between 15 and 30 mm indicates moderate trismus and mouth opening <15 mm indicate severe trismus[8].

The patients with trismus often experience difficulty in performing activities of daily living such as eating, laughing, kissing, biting, chewing, swallowing, and speaking and may further lead to poor oral hygiene, pain, weight loss, and even depression. This difficulty may affect their quality of life[9]. The radiation over 60Gr. is most likely to cause trismus[10]. Trismus if diagnosed earlier, the treatment and further prevention can be planned. Multiple modalities have been used in the treatment of trismus. Physical therapy is generally considered the mainstay of trismus treatment and is often used alone or in combination with other modalities[11]. Exercises included an active range of motion exercises, hold relax techniques, manual stretching, and joint distraction[9]. Patients were advised physiotherapy following surgery in the form of passive activities, use of tongue blades, Ferguson mouth gag, and Hiester's jaw opening device[1].

The majority of patients were visiting the oncology department with HNF cancer, and the prevalence of HNF cancer is rising day by day. The reasons behind this are tobacco chewing and cigarette smoking. The primary treatment for HNF cancer is radiation therapy and chemotherapy for a minimum of 4 to 5 months, depending on the severity of cancer. One of the acute complications of radiation therapy is the direct effect on muscles of chewing, and digestion also affects joint structure leading to limitation of jaw opening. Hence this study was planned to find out the prevalence of trismus in people with HNF cancer. If we come to know the prevalence of Trismus in HNF patients, we can expect physiotherapy for the same.

MATERIAL AND METHODOLOGY

This cross sectional study was conducted at the radiation and oncology department of a tertiary care centre. The sample was selected using convenience sampling. Total 89 subjects were included with inclusion criteria diagnosed with HNF cancer, undergoing radiation therapy for the last six months, Mouth opening at least 5 mm and prior history of surgery for malignancy.

Subjects were excluded if previous maxillofacial trauma, TMJ diseases other than malignancy, and other conditions are known to affect mouth opening. Written informed consent was obtained from each participant before actual measurement procedure.

The mouth opening was measured using digital Sliding caliper.

Measurement of the Mouth opening:

Maximal mouth opening was measured using a digital sliding caliper[1]. Measurement of mouth opening was taken with the patient in supine lying with the head supported in a neutral position. The patient was asked to open the mouth as full as possible while avoiding excessive pain. Then, the distance between the incisal edges from the maxillary central incisor to the mandibular central incisor was measured using a sliding calliper. (Fig 2) Three readings were taken for each individual, and the average was recorded as the final reading.



Fig 1. Measurement of mouth opening using a sliding calliper

The analysis was done using IBM SPSS Version 25.0. The mean, standard deviation, and the percentage were calculated on Microsoft Excel.

RESULTS

In the present study total, 89 participants were included, in that male 76 (85%), females were 13(15%). Out of 89,72 (81%) are affected by trismus.

Table 1. Genderwise prevalence of trismus

Gender	Number of people	% of people
Male	63	87
Female	09	13
Total	72	81

Table 2. Prevalence of Trismus according to the range of motion of mouth

Maximum mouth opening range	Number of people	% of people
0-5mm	3	4
6-10mm	12	17
11-15mm	7	10
16-20mm	17	24
21-25mm	6	8
26-30mm	12	17
31-35mm	14	20

According to MMO, we found trismus prevalence in range 0-5mm were 3(4%) patients; in 6-10mm range were 12(17%) patients; in 11-15mm range were 7(10%) patients; in 16-20mm range were 17(24%)patients; in 21-25mm range were 6(8%)patients; in 26-30mm range were 12(17%) patients; in range 31-35mm were 14 (20%) patients.

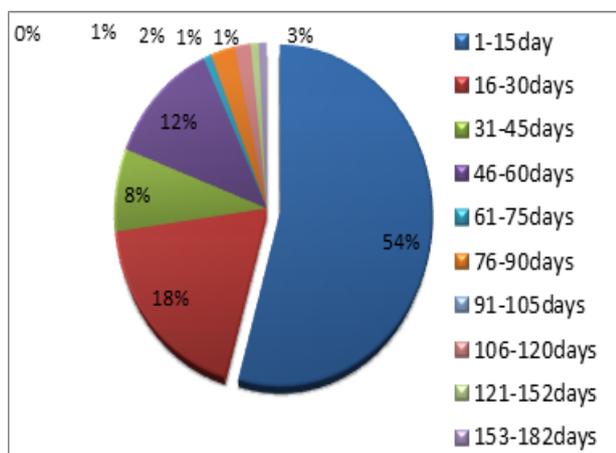


Fig 1. Prevalence according to the duration of treatment

Table 3. Prevalence according to the site of malignant tumour

Tumor site	Number of people affected	% people
Buccal mucosa	32	36
Tongue	26	30
Parotid gland	2	2
Nasal cavity	2	2
Palate	2	2
Hypophyranx	3	4
Oesophagus	5	6
Larynx	3	4
Brain tumor	3	4
Glottis	3	3
Cervical nodules	2	2
Oral cavity	1	1
Supraclavicular nodules	1	1
Submandibular nodules	1	1
Oropharynx	2	2

Prevalence of trismus according to treatment duration is, 1-15days there are 62 (54%) patients having trismus; 16-30 days there are 21(18%); 31-45 days 9(8%), 46-60 days of treatment there are 14 (12%); 61-75 days of treatments duration there are 1(1%) patient presents with trismus;76-90 days of treatment duration there are3(3%) patients with trismus; 91-105 days of

treatment duration there are 0(0%) patients; 106-120 days of treatment duration there are 2(2%) patients with trismus; 121-152 days of treatment duration there is 1(1%) patient presents with trismus; 153-182 days of treatment duration there is 1 (1%) patient present with trismus.

According to sit of a tumour, there are 32 (36%) patients diagnosed with Ca of buccal mucosa, 26 (30%) tongue cancer, 5 (6%) oesophagus, 3 (4%) with the larynx, brain tumour, hypopharynx, the glottis, 2% with parotid gland, nasal cavity, cervical nodules, oropharynx. and Capalat. 1(1%) patient with supraclavicular nodule; oral cavity; submandibular nodules.

DISCUSSION

The objective of our study was to find out the prevalence of Trismus in HNF cancer patients undergoing radiotherapy at tertiary care hospital[6]. In this cross-sectional study total, 89 patients undergoing radiation therapy at the oncology department were assessed for trismus. We measured MMO with the help of a sliding digital Vanier calliper. Normal maximum mouth opening, measured as the distance between the maxillary and mandibular incisor surfaces in healthy adults is reported to be 46 ± 7 mm (SteelmanandSokol, 1986), and 53.8 ± 6.5 mm for male and 50.4 ± 5.9 mm for female (Derksen, 1970)[3]. In this study, we found that out of 89 patients, 72 were having less than or equal to 35 mm of jaw opening[1].

Our result showed a high prevalence of trismus, i.e., 81% in HNF cancer patients undergoing radiation therapy[1]. Our results are similar to the study done by PadmanidhiAgarwal et al. in their study; they also found a high prevalence of Trismus in HNF cancer patients who had taken radiation. In their study, trismus was observed in 53.3% of patients at the time of diagnosis, which increased significantly post-surgery (86.7%) and post-radiotherapy (85.7%) and gradually decreased (65.4%) at six months. In current research majority of patients were operated cases for HNC tumours[1].

Also, another study was done by R. Leea et al. in a documented high prevalence of Trismus in HNF cancer patients undergoing radiation therapy[12]. The results showed that 41/87 (47%) of patients presented with trismus, 57/80 (71%) had postoperative trismus, and 41/52 (79%) had Trismus six months after operation or radiotherapy. In this study also the prevalence was higher postoperatively, which is similar to our results[8].

One more study was done by Gouri et al. shown the prevalence of Trismus in HNF cancer patients undergoing radiation therapy was 72.8%[12].

In our study, mainly postoperative patients undergoing radiotherapy were included. Hence as per the previous studies, prevalence is more postoperatively than the preoperative prevalence of trismus.

It is tough to discriminate the true cause of trismus occurring in head and neck malignancies. Multiple factors contribute to the development of the symptom of the trismus[13].

Simple compression of the muscles does not induce trismus. Malignancy enters the mouth cavity by direct extension from the tonsillar fossa or retromolar trigone or via perineural tumour spread along the inferior alveolar nerve (V3 sensory branch). The term reflective trismus is used for the restricted and painful mouth opening occurring in patients with peritonsillar abscess. The pathogens provoking trismus reflex are situated in or around the TMJ, masticatory muscles, oral cavity, pharynx, pterygopalatine, and infratemporal fossa, pinna, and external auditory canal. Sensory fibers from these areas travel cephalad via the second and third divisions of the trigeminal nerve and the glossopharyngeal nerve. According to Kveton and Pillsbury (1980) [6], stimulation of these fibers may transmit sensation to the principal sensory trigeminal nucleus in the pons. From here, the impulses are conducted partly centrally to the sensory cortex, where they are registered as pain and partly to the motor nucleus of the trigeminal nerve. In this way, the efferent part of the tonic reflex arch of the muscles of mastication is activated. The result is increased tonus which develops trismus[6].

The high prevalence of trismus is mainly because of the effect of the radiation on soft tissues, bone, and the muscles of the mastication. Radiation and surgery can damage tissues and structures that are critical for jaw range of motion, such as the temporal mandibular joint, muscles of mastication, and the mucosa of the oropharyngeal cavity. Soft tissue fibrosis followed by scar contracture may result in trismus[2].

Physiotherapy can play an important role in diagnosis, management and prevention of radiation induced trismus. Joint mobilisation, Active and passive stretching/strengthening exercises, Massage, ultrasound and Mobility devices can be advised for effective management of trismus if diagnosed at the earliest.[14]

CONCLUSION

The prevalence of trismus is very high, which is 81% in patients with HNF cancer undergoing radiation therapy in a tertiary care centre. Trismus is an important complication in HNF cancer or its surgical or radiation treatment.

Early diagnosis of trismus in these patients can help in timely management and also planning of preventive strategies.

Conflict of interest : Nil

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REFERENCES

1. Agarwal P, Kumar HS, Rai KK. Trismus in oral cancer patients undergoing surgery and radiotherapy. *Journal of oral biology and craniofacial research.* 2016;6:S9-13.
2. Ghiam MK, Mannion K, Dietrich MS, Stevens KL, Gilbert J, Murphy BA. Assessment of musculoskeletal impairment in head and neck cancer patients. *Supportive Care in Cancer.* 2017;25(7):2085-92.
3. Van der Geer SJ, van Rijn PV, Kamstra JI, Langendijk JA, van der Laan BF, Roodenburg JL, Dijkstra PU. Prevalence and prediction of Trismus in patients with head and neck cancer: A cross sectional study. *Head & neck.* 2019;41(1):64-71.
4. Pauli N, Johnson J, Finizia C, Andrell P. The incidence of trismus and long-term impact on health-related quality of life in patients with head and neck cancer. *Acta Oncologica.* 2013 Aug 1;52(6):1137-45.
5. Dijkstra PU, Huisman PM, Roodenburg JL. Criteria for trismus in head and neck oncology. *International journal of oral and maxillofacial surgery.* 2006;35(4):337-42.
6. Ichimura K, Tanaka T. Trismus in patients with malignant tumours in the head and neck. *The Journal of Laryngology & Otology.* 1993;107(11):1017-20.
7. Khare N, Patil SB, Kale SM, Sumeet J, Sonali I, Sumeet B. Normal mouth opening in an adult Indian population. *Journal of maxillofacial and oral surgery.* 2012;11(3):309-13.
8. Lee R, Slevin N, Musgrove B, Swindell R, Molassiotis A. Prediction of post-treatment trismus in head and neck cancer patients. *British Journal of Oral and Maxillofacial Surgery.* 2012;50(4):328-32.
9. Dijkstra PU, Sterken MW, Pater R, Spijkervet FK, Roodenburg JL. Exercise therapy for trismus in head and neck cancer. *Oral oncology.* 2007;43(4):389-94.
10. Morimoto M, Bijl Hp, Van Der Schaaf Ar, Xu Cj, Steenbakkers Rj, Chouvalova O, Yoshioka Y, Teshima T, Langendijk Ja. Development of Normal Tissue Complication Probability Model for Trismus in Head and Neck Cancer Patients Treated With Radiotherapy: The Role of Dosimetric and Clinical Factors. *Anticancer Research.* 2019;39(12):6787-98.

11. Stubblefield MD, Manfield L, Riedel ER. A preliminary report on the efficacy of a dynamic jaw opening device (dynasplint trismus system) as part of the multimodal treatment of trismus in patients with head and neck cancer. *Archives of physical medicine and rehabilitation*. 2010;91(8):1278-82.
12. Pantvaidya G, Sivasanker M, Ranganathan P, Pai P, D'cruz A. Prospective cross sectional study assessing prevalence and factors affecting trismus after multimodal treatment for oral cancers. *Head & neck*. 2019 ;41(2):286-90.
13. Epstein JB, Robertson M, Emerton S, Phillips N, Stevenson Moore P. Quality of life and oral function in patients treated with radiation therapy for head and neck cancer. *Head & neck*. 2001;23(5):389-98.
14. Dhanrajani PJ, Jonaidel O. Trismus: aetiology, differential diagnosis and treatment. *Dent Update*. 2002;29(2):88-94.