

# Physical therapy in cancer related vs non-cancer trismus

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## SUMMARY

**Objective.** Trismus may be caused by several factors including those related with cancer and non-cancer disorders. The purpose of our study was to explore the effectiveness of physical therapy in cancer related vs non-cancer trismus.

**Material and methods.** Thirty trismus patients who had undergone radiotherapy due to a tumor at the maxillary or nasopharyngeal region (cancer group) and 65 trismus patients with various underlying causes (non-cancer group) were enrolled. Fifteen sessions of physical therapy have been applied to both TMJ regions of the patients. Patients performed active manual stretching and relaxation exercises with the company of a physiotherapist after each physical therapy session.

**Results.** Although maximal mouth opening (changing from 17.7±5.4 to 27.4±6.9 mm in non-cancer group and from 10.5±5.6 to 12.8±6.9 mm in cancer group) and VAS values (changing from 58.4±21.5 to 41.8±22.4 mm in non-cancer group and from 68.3±25.7 to 60.3±25.7 mm in cancer group) showed significant improvements in both groups at the end of the physical therapy program (p=0.00); the difference was significantly higher in the non-cancer group (p=0.00). Post-treatment patient global self-assessment was found to be significantly higher in the non-cancer group when compared with the cancer group (p=0.005).

**Conclusions.** In summary, combined physical therapy and exercise program appears to be effective in the treatment in both cancer related and non-cancer trismus. But clinical relevance of the results is doubtful and far from satisfying in the patients with cancer related trismus.

**Key words:** trismus, physical therapy, cancer.

## INTRODUCTION

Trismus (temporomandibular joint (TMJ) hypomobility) may be caused by several factors including dental infection, peritonsillar abscess, noma, TMJ muscle injuries, mandibular infections, congenital anomalies, orofacial traumas or surgical interventions, TMJ disc displacements, head and neck malignancies and radiotherapy (1-6).

It is reported that trismus can develop at a rate of 5-38% during the treatment of head and neck cancers (7). Oropharyngeal cancer related trismus can be caused by the tumor itself, by the oncologic treatment, or by both (8, 9). When tumor infiltrates

the muscles neighboring the TMJ, a reflex contraction ensues at the muscles closing the mouth. Scars and fibrous bands related with radiotherapy may cause serious limitation in the mouth opening (10, 11).

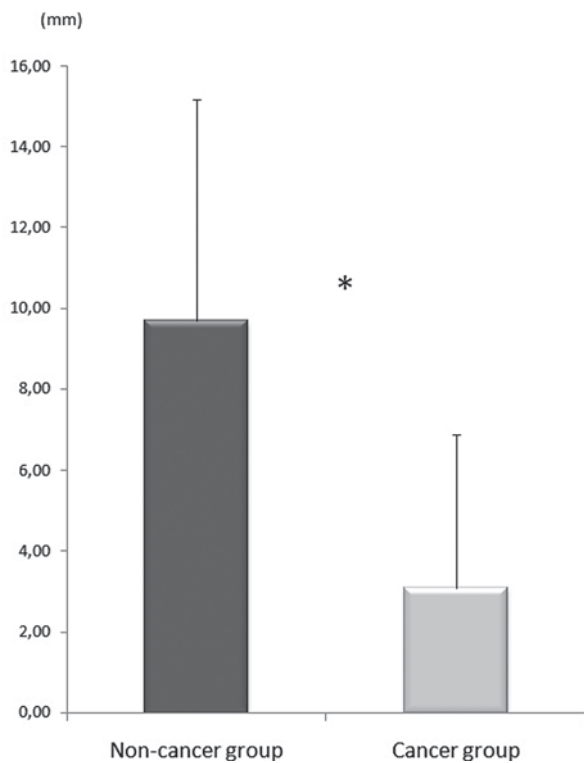
Many methods have been suggested in the treatment of trismus. These include assisted and unassisted stretching exercises, various apparatuses, computer-aided devices, low-level laser therapy, pentoxifylline and surgical treatments (12-17). Superficial heat, therapeutic ultrasound and *transcutaneous electrical nerve stimulation* (TENS) may also be used for increasing the ease of application and the efficiency of stretching exercises (18, 19).

To the best of our knowledge, there has been no study carried out to investigate the effects of combined physical therapy and exercise program in cancer related trismus. Therefore, the purpose of our study was to explore the effectiveness of physical and exercise therapy in cancer related vs non-cancer trismus.

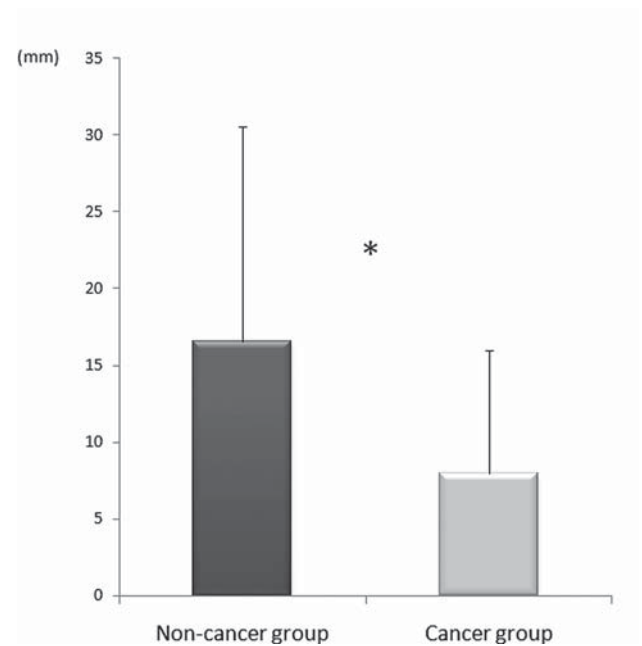
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**Fig. 1.** Comparison of the differences of maximal mouth opening between the groups after physical therapy program (\* p<0.01)



**Fig. 2.** Comparison of the differences of VAS between the groups after physical therapy program (\* p<0.05)

**Table 1.** Demographic features of the subjects

	Cancer group (n=30)	Non-cancer group (n=65)	P
Age (year)	38.8±11.1	34.7±10.8	0.10
Sex (F/M)	17/13	45/20	0.25
Initial maximal mouth opening (mm)	10.5±5.6	17.7±5.4	0.00
Initial VAS	68.3±25.7	58.4±21.5	0.07
Tumor localization	primary oropharynx (7) primary maxilla (5) primary parotis (3) primary mouth base (3) NHL – oropharynx metastasis (2) primary mandibula (2) primary tongue (2) NHL – orbital metastasis (1) primary submandibular gland (1) primary soft palate (1) primary nasal cavity (1) breast cancer - mandibula metastasis (1) lung cancer - cranium metastasis (1)	–	
Cause of trismus	–	DDw/oR (25) TMJ deeneration (12) post-operative (9) non-fracture trauma (7) mandibular fracture (6) after dental treatment or post-injection (6)	
Total radiation dose (Gy) (median, min-max)	60 (30-66)	–	

VAS – visual analogue scale, NHL – non-Hodgkin lenfoma, DDw/oR – disc displacement without reduction, TMJ – temporomandibular joint, Gy – gray.

## MATERIAL AND METHODS

Thirty trismus patients who had undergone radiotherapy due to a tumor at the maxillary or nasopharyngeal region (cancer group) and 65 trismus patients with various underlying causes (non-cancer group) were enrolled. Subjects in both groups were recruited from patients who applied to our multidisciplinary TMJ unit with a complaint of restriction in their mouth opening and who had less than 25 mm of maximal mouth opening on evaluation.

Patients with congenital joint ankylosis, skin infection, active synovitis or joint effusion that may contraindicate physical therapy on the TMJ, as well as patients who were not able to attend 15 treatment sessions were excluded from the study.

The subjects were informed about the study procedure and they gave informed consent to participate. Local ethical committee approved the study protocol.

### Physical therapy and exercise program

A total of 15 sessions has been applied to both TMJ regions of the patients. Combined physical therapy included conventional TENS (0.5 watt/cm<sup>2</sup>, 30 minutes) via 2 surface electrodes, ultrasound via small probes (3 Hz, 4 min), and hot pack (20 min).

Patients performed active manual stretching and relaxation exercises with the company of a physiotherapist after each physical therapy session. They were additionally requested to carry out a home program consisting of self-stretching, active range of motion and relaxation exercises.

**Table 2.** Demographic features of the subjects

Measurement	Trismus type	Before physical therapy	After physical therapy	p
Maximal mouth opening (mm)	non-cancer	17.7±5.4	27.4±6.9	0.00
	cancer	10.5±5.6	12.8±6.9	0.00
VAS	non-cancer	58.4±21.5	41.8±22.4	0.00
	cancer	68.3±25.7	60.3±25.7	0.00

**Table 3.** Patients' self-assessment after physical therapy

	Non-cancer	Cancer	p
No effect was seen	9	14	0.005
Had some effect, but not sufficient	19	8	
Had noticeable effects, it can be improved though	17	6	
Satisfactorily good	18	2	
Excellent therapy	2	-	

### Patient assessment

Maximal mouth opening of each patient was measured before and after 15 sessions of therapy. Pain during jaw motions were measured via 100 mm visual analogue scale (VAS). Patients were asked to assess the effectiveness of the therapy globally at the end of the therapy. Designed to measure the efficiency of therapy, the self-assessment form included the options of: i) no effect was seen; ii) had some effect, but not sufficient; iii) had noticeable effects, it can be improved though; iv) satisfactorily good; and v) excellent therapy.

### Statistical analysis

SPSS 15.0 software has been used for statistical analysis. Mann Whitney U Test was used for the comparison of inter-group differences, while Wilcoxon test was used for the pre-treatment and post-treatment comparison within the group analysis. Significance level was accepted as  $p < 0.05$ .

## RESULTS

Demographic data of the patients are given in Table 1. A comparison of the groups before the therapy showed that initial maximal mouth opening values were significantly lower in the cancer group compared with the non-cancer group, while there was no significant difference between the groups in terms of initial VAS values (Table 1).

Although maximal mouth opening and VAS values showed significant improvement in both groups at the end of the physical therapy program (Table 2); the difference was significantly higher in the non-cancer group (Figures 1 and 2).

Post-treatment patient global self-assessment was found to be significantly higher in the non-cancer group when compared with the cancer group (Table 3).

## DISCUSSION

In our study, we have explored the effects of physical and exercise therapy in cancer-related vs non-cancer trismus. Our results have shown that the treatment was beneficial in both groups while the outcome and patient satisfaction were better in non-cancer group.

There are very few studies assessing the role of physical therapy in the treatment of cancer related trismus.

Similar to our study, Dijkstra *et al.* (14) shows that physical exercise yields significantly better results in non-cancer trismus than cancer-related trismus cases. However, the size of their study population was small and they used different therapy alternatives making it difficult to ascertain the effects of each treatment. We have applied a standard physical therapy and exercise program for a considerably large amount of patients. It has been demonstrated that TENS and faradic electric stimulation decreased the pain and thus eased the forced mouth-opening exercises in cases of trismus caused by post-operative TMJ immobilization (20, 21). Although superficial heat applications are frequently used in the treatment of trismus together with stretching exercises in clinical practice, we could not find any study concerning this topic. Likewise, there is only one study reporting the use of therapeutic ultrasound in trismus (22).

Cancer-related trismus can develop due to many reasons. Invasion of the tissues around the joints by the tumor may lead to reflex muscle contraction, hence causing reduced muscle flexibility. Additionally, cancer-treatment may itself lead to trismus (10, 11). Above all, radiotherapy is the most important underlying cause in such patients. It is believed that early reactions like mucositis and late reactions such as fibrosis formed in the muscles and the ligaments around the TMJ and scar tissues induced by radiation injury play significant role in the formation of trismus (9). According to Goldstein *et al.* (8), negative effects on mouth opening increase in parallel with the dosage of local radiotherapy. It is very difficult to stretch a tissue once fibrosis develops in it. All of the cancer-related trismus patients that participated in our study had previously received radiotherapy in

their head-neck regions. Thus, we believe that the reason they responded to physical therapy less than the non-cancer group could be due to fibrosis. Reduced mouth opening in the non-cancer group stems from voluntary inhibition secondary to pain and inflammation in general, and from contraction secondary to inflammation of the capsular ligaments. These changes may have therefore responded well to physical therapy in the absence of joint ankylosis (23).

Buchbinder *et al.* (13) have shown that the use of specific apparatus and unassisted stretch exercises were more effective in radiotherapy-related jaw hypomobility when compared with exercises alone. It has been demonstrated that the use of the apparatus in the post-operative early period in cancer-related trismus yielded positive results that also pleased the patients (24).

Patients in the non-cancer trismus group in our study were heterogeneous. The major limitation of our study was the difference between the initial maximal mouth opening values of cancer-related and non-cancer trismus cases. This might have also contributed to our findings of worse treatment outcome in the cancer group.

## CONCLUSIONS

As a result, combined physical therapy and exercise program appears to be satisfactory and effective in the treatment of non-cancer trismus. Although these treatment protocols also increased maximal mouth opening in cancer-related trismus, clinical relevance of the results is doubtful and far from satisfying the patients. New methods are definitely awaited for the prevention and treatment of cancer-related trismus.

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Received: 11 05 2015  
Accepted for publishing: 28 12 2016