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Original Research Article

EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION NECK PATTERN EXERCISE ON CERVICAL RANGE OF MOTION AND QUALITY OF LIFE IN POST-OPERATIVE HEAD AND NECK CANCER PATIENTS: AN INTERVENTIONAL STUDY

Renu Pattanshetty [1], Oshin Diana Mathias *[2].

[1] Associate Professor and Head, Department Of Oncology Physiotherapy, KAHER Institute Of Physiotherapy, Nehrunagar-Belagavi, Karnataka, India.

*[2] MPT 1st Year Oncology Physiotherapy, Department Of Oncology Physiotherapy, KAHER Institute Of Physiotherapy, Nehrunagar- Belagavi, Karnataka, India.

ABSTRACT

Background: Head and neck cancer (HNC) is the sixth most common type of cancer, representing about 6% of all cases, accounting for an estimated 65,000 new cancer cases and 3,50,0000 cancer deaths worldwide every year. The incidence of HNC increases with age especially after age of 50 years. Cervical disability in terms of chronic neck pain with restriction of cervical movements occurs following surgery that contribute to the decrements in Quality of Life.

Objective: The objective of the present study was to determine the effects of Proprioceptive Neuromuscular Facilitation neck pattern exercises on cervical ROM and quality of life in post-operative head and neck cancer patients.

Settings and design: The study was undertaken in a tertiary health care centre for a period of 06 (six) months.

Methodology: Twenty one (21) patients undergoing chemotherapy treatment were recruited in the intervention based on the inclusion and exclusion criteria. Proprioceptive neuromuscular facilitation (PNF) excercises are progressive resistance exercises to improve limited ranges and strengthen muscles which was performed 10 times of 3 sets for one week. Pre & post outcome measures recorded were Neck Disability Index (NDI), Functional Assessment Of Cancer Therapy-Head and Neck cancer (FACT-H&N) Version 4, The Vanderbilt Head And Neck Cancer Symptom Survey (Version 2.0) and Cervical ROM was measured using Universal goniometer which were computed at baseline and after the end of the treatment.

Results: Statistically significant changes in all the ranges of cervical movements as well as in all the domains of Neck Disability Index (NDI), The Vanderbilt Head And Neck Cancer Symptom Survey (Version 2.0), Functional Assessment Of Cancer Therapy-Head and Ncek cancer (FACT-H&N) Version 4 except in the emotional wellbeing where no significant improvement was seen.

Conclusion: Proprioceptive Neuromuscular Facilitation may be used as one of the remedial exercise for improving the Cervical ROM restriction and Quality Of Life in Post-Operative Head And Neck Cancer patients.

KEY WORDS: Head and Neck Cancer, Proprioceptive Neuromuscular Facilitation, Cervical ROM, Quality Of Life.

Address for correspondence: Oshin Diana Mathias, MPT 1st Year Oncology Physiotherapy, Department Of Oncology Physiotherapy, KAHER Institute Of Physiotherapy, Nehrunagar- Belagavi, Karnataka, india. Contact no: +91-7795991463, **E-Mail**: droshinphysio@gmail.com

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INTRODUCTION

Head and neck cancer (HNC) is broad term that encompasses epithelial malignancies that arise in the paranasal, sinuses, nasal cavity, oral cavity, pharynx and larynx [1]. The two major causes of HNC are tobacco and alcohol consumption [2]. Head and neck cancer is the sixth most common type of cancer, representing about 6% of all cases and accounting for an estimated 65.000 new cancer cases and 3,50,0000 cancer deaths worldwide every year [1]. The incidence of HNC increases with age especially 50 years [3]. Treatment for head and neck cancer involves surgery, radiotherapy and chemotherapy [4].

Cervical disability, chronic neck pain with limited neck and shoulder ROM are common problems after surgery for head and neck cancers. Decreased scar mobility after a neck surgical procedure can limit range of motion, especially in the directions of rotation and extension. Forward head posture may subsequently develop leading to neck pain and muscle spasm along with headaches [5].

Impairment is most often observed during the period of active treatment, particularly related to physical side effects and associated functional limitations. Neck disability and impaired neck function in HNC contribute to decrements in Quality of Life [6].

Physiotherapy plays major role in rehabilitation of head and neck cancer survivors in restoring physically, emotionally and socially [7]. Proprioceptive neuromuscular facilitation (PNF) is one of the therapeutic exercises which may help to improve the function of the muscles and tendons by stimulating the proprioceptive sense, which enhances muscle strength, flexibility and balance. It is frequently used in therapeutic exercises as a progressive resistance for functional training, improve limited ranges and to strengthen the muscles.[8] Therefore the aim of the present study was to determine the effect of PNF on patients operated with head and neck cancer including cervical ROM and Quality of Life.

MATERIALS AND METHODS

Design: In the present experimental study, twenty one (21) patients, including 10 women and 11 men were recruited among the patients operated for various types of Head and Neck cancers from two tertiary care centers in South India. Ethical clearance was obtained from the Institutional Review Committee (IRC), prior to the commencement of the study. A written informed consent was then obtained from all the patients. The study protocol was explained to all the patients in their vernacular language (English, Hindi, Marathi, Kannada). A brief demographic data was noted prior to the initiation of the intervention.

Study participants: The patients were recruited into the study if they were within the age group of 18- 70 years [7], diagnosed with any stage of head and neck cancer, with completion of chemotherapy/ radiation therapy followed by surgical treatment including radical neck dissection, modified radical neck dissection and other selective type of surgery [9].

Patients with a history of shoulder or neck pathology unrelated to cancer treatment, any comorbid illness or psychiatric illness that would prevent or interfere with completion of treatment [10], any active bacterial/ viral infection[9] and those not willing to participate in the study were excluded.

Procedure: The patients were instructed to sit on the bed with their feet placed shoulder width apart and place their hands on the knees to start with the intervention.

Neck Flexion PNF Pattern: The therapist stood behind the patient on the right side and placed the tip of her right finger below the patient's chin. Then the therapist placed her left hand on top of the patient's head slightly on the left side in a diagonal direction. The therapist slightly pulled the chin so that it was lifted and causing the neck to extend. Commands such as "pull your chin in" and "look at your left hip" were given to the patient. Resistance was given against left rotation, flexion and lateral flexion along with the traction to the patient's chin [8].

Neck Extension PNF Pattern: The therapist stood behind the patient on the right side and placed her right thumb on the right side of the patient's chin. Then the therapist placed her left hand on top of the patient's head slightly on the

right side in a diagonal direction. The therapist slightly pulled the chin so that the neck was flexed, head was rotated and tilted to the left. Commands such as "lift your chin and then "lift your head to look above were given to the patient. Passive resistance was provided against right rotation, extension and lateral flexion [8].

DOSAGE OF EXERCISES: Each of the above mentioned PNF patterns were performed 10 times of 3 sets once a day, approximately 30 mins for a duration of 1 week during their hospital stay.

Outcome Measures: Neck disabilities like neck pain with the associated restriction of ADLs were measured using Neck Disability Index (NDI) and the Quality of life specific to Head and Neck cancer was quantified by FACT-H&N (Version 4) and The Vanderbilt Head and Neck Symptom Survey (Version 2.0) was taken to measure the various problems associated with the patients undergoing various cancer treatments. Cervical range of motion was measured using the Universal Goniometer.

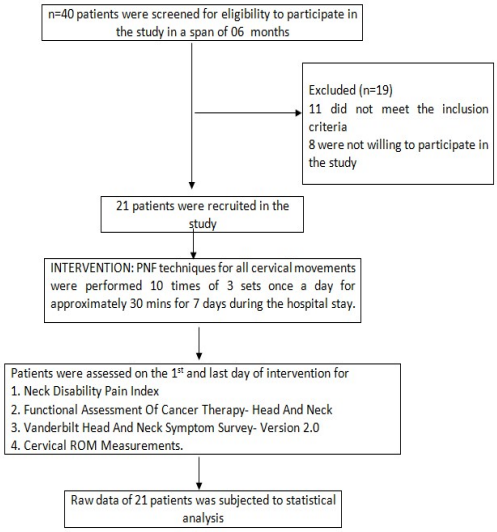
1.NECK DISABILITY INDEX (NDI): NDI is a modification of the Oswetry low back Pain Disability Index. It can be scored as a raw score or doubled and expressed as a percent. Each section is scored on a 0 to 5 rating scale, in which zero means 'No pain' and 5 means 'worst imaginable pain'. the maximum score of 50 or as a percentage [11].

2. FUNCTIONAL ASSESSMENT OF CANCER THERAPY–HEAD AND NECK CANCER (FACT-H&N) VERSION 4: Multidimensional, self-report Quality of Life instrument specifically designed for use with head and neck patients. It consists of 27 core items which assess patient functions in four domains : Physical, Social/ family, Emotional and Functional well being which is further supplemented by 12 site specific items to assess head and neck cancer related symptoms. Each item is rated on a 0-4 Likert type Scales and then combined to produce subscale scores for each domain as well as an global QOL scores. High scores represent better QOL [12].

3.THE VANDERBILT HEAD AND NECK CANCER SYMPTOM SURVEY (VERSION 2.0): It was developed to assess symptom burden in head and neck cancer patients undergoing primary or adjuvant radiation based therapy. It is a feasible oral health outcome subscale with 50 item survey, scored 0 (none) to 10 (severe) and can be completed in a timely manner [13].

4. CERVICAL ROM GONIOMETRY: ROM was measured in a standardized sitting position to remove errors and movement compensation. The patients were asked for sitting, with thoracic & lumbar spine well supported by the back of the chair. Patient's ankles, knees and hips were positioned at right angle and arms were folded across the chest to minimize thoracic movement. The first movement was flexion, second extension, third right side flexion, fourth left side flexion, fifth right rotation and at the end left rotation. All these cervical movements were performed in the same order during each measurement across both test sessions. Prior to testing, each patient was requested to perform all the six cervical motions to end range actively in the set sequence to reduce creep and to familiarize him with the testing procedure [14].

Fig. 1: Flow chart of patient recruitment process for the study.



Statistical Analysis: Statistical analysis for the present study was done manually as well as using statistical package of social sciences (SPPS) version.21 so as to verify the results obtained. Various statistical measures such as mean, median, standard error, standard deviation were used. Nominal data such as patient's demographic data i.e. age, BMI (kg/m^2), height (mts), weight (kgs) distribution were analyzed. Normality of all the parameters was determined

by the Kolmogoprov Smirnov test and as the data followed a normal distribution, paired student t-test was used to analyse the outcome measures i.e Neck Disability Pain Index, Functional Assessment Of Cancer Therapy, Vanderbilt Head and Neck symptom survey and cervical ROM measurements. With the power of 80% probability values of less than 0.05 were considered statistically signifinicant.

RESULTS

Table 1: Demographic data of patients (n=21) in the study.

Gender	Male (n=11)	Female (n=10)	Total (n=21)
Age	47.09± 10.28	49.20 ± 11.97	48.10± 10.89
Height	160.73± 6.36	149.00± 12.72	155.14 ±11.36
Weight	59.55 ±13.03	52.90± 16.89	56.38± 15.00
BMI	22.73± 4.78	23.30± 6.53	23.00± 5.54

Table 2: Distribution of types of head and neck cancer and the different surgeires conducted in all patients in the study.

Types of Head and Neck cancers	Number of patients	% of Distribution
Ca Parotid Gland	3	14.28%
Ca Tongue	3	14.28%
Ca Throat	1	4.76%
Ca Cheek	1	4.76%
Ca Thyroid	2	9.52%
Ca Buccal Mucosa	9	42.85%
Ca Lymph node	1	4.76%
Ca Lip	1	4.76%
Total	**21**	
Type of surgery conducted	**Number of patients**	**% of distribution**
Parotidectomy	3	14.28%
Partial Glossectomy	2	9.52%
Mandibullectomy with total glossectomy	1	4.76%
Total Thyroidectomy	3	14.28%
Hemithyroidectomy	1	4.76%
Maxillectomy	1	4.76%
Mandibullectomy with Neck dissection	7	33.33%
Commando Surgery, composite resection and reconstruction	3	14.28%
Total	**21**	

Ca= cancer

Table 3: Comparison of pretest & posttest scores of Neck Disability Index (NDI) and Vanderbilt HNN Symptom scores (VHNNSS) of all patients in the study.

Outcome measures	Time	Mean & SD	% Of Change	Paired t	P-Value
NDI	Pretest	47.05± 5.79	19.84	11.3369	0.0001*
	Posttest	37.71± 6.82			
VHNNSS	Pretest	222.76± 43.24	20.04	9.7311	0.0001*
	Posttest	165.31± 31.66			

*Level of significance pd ≤ 0.05

Table 4: Comparison of pretest and posttest scores of Cervical Range of Motion (ROM in degrees) of all patients in the study.

Cervical ROM	Time	Mean & SD	% Of Change	Paired "t" test	P-Value
Flexion	Prestest	25.33±8,52	-98.87	-10.5914	0.0001*
	Posttest	50.38±11.25			
Extension	Prestest	22.33±7,87	-97.23	-6.9193	0.0001*
	Posttest	44.05±14.28			
Rotation Right	Pretest	22.29±6.91	-113.68	-15.399	0.0001*
	Posttest	50.14±10.22			
Rotation Left	Pretest	22.38±8.61	-124.04	-18.5196	0.0001*
	Prestest	50.14±10.22			
Side Flexion Right	Pretest	21.52±9.31	-112.83	-8.7139	0.0001*
	Posttest	45.81±10.62			
Side Flexion Left	Pretest	23.24±10.11	-87.5	-6.5185	0.0001*
	Posttest	43.57±14.08			

*Level of significance pd ≤ 0.05

Table 5: Comparison of Pretest and Posttest scores Of All Components Of FACT-HNN (Functional Assessment of Cancer Therapy-Hean and neck) Questionnaire of all the patients in the study.

Component	Time	Mean & SD	% Of Change	Paired student "t" test	p-Value
Physical Wellbeing	Pretest	20.34±2.64	26.34	8.7468	0.0001*
	Postest	15.05±2.99			
Social Wellbeing	Pretest	18.19±2.16	-21.47	-6.0353	0.0001*
	Posttest	22.10±3.25			
Emotional Wellbeing	Pretest	17.19±3.43	6.09	1.4924	0.1512
	Posttest	16.14±2.97			
Functional Wellbeing	Pretest	17.19±3.43	-64.17	-9.0682	0.0001*
	Posttest	16.14±2.97			
Additional Wellbeing	Pretest	17.10±3.19	-15.6	-3.7653	0.0012*
	Posttest	19.76±2.83			

*Level of significance pd ≤ 0.05

The baseline data demonstrated a homogenous sample with a mean age of 48.10 years. A total of twenty one (21) patients completed the seven (07) days of intervention. Neck disability pain index and Vanderbilt head and neck symptom survey scores show a statistically significant reduction in the pre and post interventions with the p value of 0.0001. Significant improvement in Quality of life was noted in all patients by the FACT-HNN scores with p value of <0.05 for all the domains i.e. physical (p=0.0001), social (p= 0.0001) , functional wellbeing (p=0.0001) and additional concerns (p=0.0012) except for emotional wellbeing (p=0.1512) which did not seem to show significance. Cervical ROM measurements were proved to be improved with statistically significant changes from pre to post inetervention period (p=0.0001) in all the directions i.e. flexion, extension, lateral flexion, left and right rotations.

DISCUSSION

The present study evaluated the effect of Proprioceptive Neuromuscular Facilitation (PNF) neck pattern exercise on cervical ROM and

Quality of life in 21 post-operative head and neck cancer patients for a period of 7 days during their stay in the hospital. The results of the present study suggest that PNF reduces pain, enhances the flexibility thus causing an improvement in the restricted neck range of motion and the Quality of life.

Head and neck cancer patients undergoing various surgeries followed by reconstruction have many acute and chronic complications. The chronic complications involve the neck and shoulder pain, dysfunction, stiffness, trismus etc. Loss of motor innervations to the sternocleidomastoid and trapezius results in reduced mobility and strength of shoulder leading into reduced cervical ROM. Rehabilitation of head and neck cancer patients prevents and treats the complications arisen because of the surgical management and helps them restore physically, emotionally and socially.[15] PNF techniques have been known to be effective for the functional improvement as well as strengthen and stretch the neck muscles [16].

The effectiveness of PNF and manual therapy methods in cervical spine osteoarthritis especially in the reducing pain and improving functionality in everyday life was evaluated and concluded that the PNF group showed greater reduction in pain than the manual group along with greater improvement in performing daily activities such as sleeping, personal care, travelling, work, recreation, lifting , walking and standing that decreased the intensity and frequency of pain [16]. PNF neck pattern exercises were performed by chronic stroke patients which showed to have a positive effect on increasing the ability to control the trunk and maintain balance [8].

However the present study did not include truncal balance as an outcome measure. Lee JH concluded that exercise programs that apply PNF techniques can be said to be effective in myofascial pain patients for improving function.[17] An extensive clinical review stated that PNF stretching may be more effective for immediate gains in range of motion than other forms of stretching [18].These studies are similar to the results of the present study which demonstrated significant improvement in the overall scores of pain and ROM, head posture and Quality of life.

The effect of stabilization and PNF exercises on cross-sectional area of deep cervical flexor muscles in chronic non-specific neck pain patients was evaluated using VAS and Neck Disability Index. There was a significant decrease observed in both the VAS and NDI scores post intervention which proves to be effective in reducing cervical pain and disability [19]. The Vanderbilt Head And Neck Symptom Survey was used to evaluate the several symptoms including the oral ones in Head and Neck cancer patients undergoing radiotherapy. It presented good results for most of the domains like swallowing solids, dry mouth, mouth pain, mucous, voice pain and taste/smell.[20] The present study shows similar significant changes in the NDI and VHNSS scores post intervention which can state that PNF exercises can reduce pain, neck disability, associated post-surgical oral complications, head and neck–specific symptom burden and function loss.

Rehabilitation programs help resolve the problems experienced after surgery and psychological distress appearing in return to the society. The effect of PNF technique program after mastectomy in forty five (45) female breast cancer patients having lymphedema was observed which had shown significant decrease in depression and anxiety during the initial assessments but no significant improvement after 4 weeks[21]. The emotional well being component of FACT-HNN which questions about the depression and anxiety used in the present study also showed the similar results of decline in the scores and no significant improvement compared to the other components of functional, social, physical and additional concern components of the questionnaire.

The findings of the present study illustrates that PNF can be used in an exercise protocol in conjunction with conventional physiotherapy in the rehabilitation process of Head and neck cancer patients especially post-operative with restriction of cervical motion, pain and psychological distress . This study can be considered as the first interventional study to use PNF technique to assess the improvement of cervical restriction and Quality of life following Head and neck cancer surgeries. Thus, it can aid the concerned health care professionals to

use this technique responsible in improving and managing the distressing symptoms associated with surgery and reconstruction.

PNF is a patient self-exercise method to move within their ability without pain [16]. It is easy to learn and perform in any stable position of standing or sitting. However, the results of the present study may not be generalized due to a relatively small sample size and less duration of intervention. The future scope will be to include a study of a larger patient size with multicentre trails and longer duration of intervention.

CONCLUSION

PNF may be used as a remedial exercise to reduce pain, improve cervical ROM and Quality of life for patients who have undergone head and neck cancer surgery following reconstruction in any clinical setup of the Indian scenario.

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Conflicts of interest: **None**

REFERENCES

[1]. Argiris, A., Karamouzis, M., Raben, D. and Ferris, R. Head and neck cancer. The Lancet, 2008;371(9625):1695-1709.

[2]. Rettig, E. and D'Souza, G. Epidemiology of Head and Neck Cancer. Surgical Oncology Clinics of North America, 2015;24(3):379-396.

[3]. Baxi, S., Shuman, A., Corner, G., Shuk, E., Sherman, E., Elkin, E., Hay, J. and Pfister, D. (2012). Sharing a diagnosis of HPV-related head and neck cancer: The emotions, the confusion, and what patients want to know. Head & Neck, 2012;35(11):1534-1541.

[4]. Sugita, K., Mori, Y., Kanemoto, K. and Sugita, S. Physiotherapy and Head and Neck Cancers. Journal of Novel Physiotherapies 2017;07(02).

[5]. Google.co.in. DECREASED SHOULDER & CERVICAL RANGE OF MOTION (ROM) AND STRENGTH 2017.

[6]. Murphy, B.A., Ridner, S., Wells, N. and Dietrich, M. Quality of life research in head and neck cancer: a review of the current state of the science. Critical reviews in oncology/hematology, 2007;62(3):251-267.

[7]. Tacani, P.M., Franceschini, J.P., Tacani, R.E., Machado, A.F.P., Montezello, D., Góes, J.C.G.S. and Marx, A. Retrospective study of the physical therapy modalities applied in head and neck l ymphedema treatment. Head & neck, 2016;38(2):301-308.

[8]. Hwangbo, P.N. and Kim, K.D. Effects of proprioceptive neuromuscular facilitation neck pattern exercise on the ability to control the trunk and maintain balance in chronic stroke patients. Journal of physical therapy science, 2016;28(3):850-853.

[9]. Ortíz, V.M.S., Ornelas, G.E.A., Cantisani, J.A.F., Torres, J.I.R. and Flores, F.C. Interventional Techniques for Head and Neck Cancer Pain. In Diagnosis and Management of Head and Neck Cancer. InTech 2017.

[10]. McNeely, M.L., Parliament, M.B., Seikaly, H., Jha, N., Magee, D.J., Haykowsky, M.J. and Courneya, K.S. Effect of exercise on upper extremity pain and dysfunction in head and neck cancer survivors. Cancer, 2008;113(1):214-222.

[11]. Vernon, H. and Mior, S. The Neck Disability Index: a study of reliability and validity. Journal of manipulative and physiological therapeutics, 1991;14(7):409-415.

[12]. Bonomi, A.E., Cella, D.F., Hahn, E.A., Bjordal, K., Sperner-Unterweger, B., Gangeri, L., Bergman, B., Willems-Groot, J., Hanquet, P. and Zittoun, R. Multilingual translation of the Functional Assessment of Cancer Therapy (FACT) quality of life measurement system. Quality of Life research, 1996;5(3):309-320.

[13]. Cooperstein, E., Gilbert, J., Epstein, J.B., Dietrich, M.S., Bond, S.M., Ridner, S.H., Wells, N., Cmelak, A. and Murphy, B.A. Vanderbilt Head and Neck Symptom Survey version 2.0: report of the development and initial testing of a subscale for assessment of oral health. Head & neck, 2012;34(6):797-804.

[14]. Farooq, M.N., Bandpei, M.A.M., Ali, M. and Khan, G.A. Reliability of the universal goniometer for assessing active cervical range of motion in asymptomatic healthy persons. Pakistan journal of medical sciences, 2016;32(2):457.

[15]. Krause, N. Head and Neck Imaging, 5th Ed. Academic Radiology, 2012;19(8):1044-1045.

[16]. Maicki, T., Bilski, J., Szczygie³, E. and Tr¹bka, R. PNF and manual therapy treatment results of patients with cervical spine osteoarthritis. Journal of back and musculoskeletal rehabilitation, 2017; 30(5):1095-1101.

[17]. Lee, J.H., Park, S.J. and Na, S.S. The effect of proprioceptive neuromuscular facilitation therapy on pain and function. Journal of physical therapy science, 2013;25(6):713-716.

[18]. Page, P. Current concepts in muscle stretching for exercise and rehabilitation. International journal of sports physical therapy, 2012;7(1):109.

[19]. Parisa, G.H., ashtiani Ahmadreza, A., Mohammad, H., Asghar, A., Leila, R. and Fateme, G. Investigating the effect of stabilization exercise and proprioceptive neuromuscular facilitation exercises on cross-sectional area of deep cervical flexor muscles in patients with chronic non-specific neck pain. International Journal of Medical Research and

Health Sciences, 2016;5(11):502-508.

[20]. Barroso, E.M., Carvalho, A.L., Paiva, C.E., Murphy, B.A. and Paiva, B.S.R. The Vanderbilt Head and Neck Symptom Survey Brazilian Portuguese version 2.0 (VHNSS 2.0): psychometric properties for patients with head and neck cancer who have undergone radiotherapy. BMC research notes, 2015;8(1):522.

[21]. Ha, K. and Choi, S. The effect of a PNF technique program after mastectomy on lymphedema patients' depression and anxiety. Journal of physical therapy science, 2014;26(7):1065-1067.

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