

Yoga as a holistic approach for stress management in Oral Cancer patients. A prospective study

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ABSTRACT

Background and Aims: Oral cancer has been ranked as the sixth most common cancer globally. It has been reported to be increasing in incidence especially, in the southern parts of Asia which chiefly includes, India. Diagnosis of oral cancer is followed by a vigorous and highly morbid treatment protocol which drastically impacts the patient's quality of life. This in turn can cause extreme stress in a person. This study aimed to assess the impact of the practice of Yoga on stress levels in cancer patients. **Materials and Methods:** A total of 200 subjects diagnosed with oral cancer were selected for this study. Their stress levels were scored both before and after initiating the practice of Yogic exercises in a one-month interval using a questionnaire. Obtained scores were entered in Microsoft Excel 2007 worksheet and an unpaired t-test was applied. *P* values of less than 0.05 and 0.001 were considered statistically significant and extremely significant, respectively. **Results:** Study results showed a reduction in stress level scores (48 ± 0.99 to 37 ± 5.2) after adopting yoga for one month. An extremely significant *P* value of less than 0.001 was obtained. **Conclusion:** It can be concluded from this study that yoga is an effective method in reducing stress levels in individuals diagnosed with oral cancer.

Keywords: Oral cancer, quality of life, stress, Yoga

Introduction

The word 'Yoga' is a derivation from Sanskrit "Yuj", which means 'to unite or union'. Its regular practice has been shown to have an improvement in stamina, strength, flexibility, efficiency of the cardio-respiratory system, musculoskeletal coordination and quality of sleep, along with cognitive functions and blood-brain flow alterations. Yoga is commonly employed complementary and alternative medicine technique that has proven its efficacy in

treatment and prevention of type II diabetes, cardiovascular diseases, disorders of the musculoskeletal system, depression, anxiety, and other psychological problems.^[1] Yoga practice is an inexpensive, non-invasive, and includes breathing exercises along with meditation.^[2]

Stress is defined as 'state of affairs which involves a demand on mental as well as physical energies'. It harms by overwhelming the nervous system and adrenal glands. This, in turn, causes an immunological disturbance. There are increased levels of catecholamine along with cortisol which are mediated via the hypothalamic-pituitary-adrenal axis.^[3]

Anxiety is a natural response when a person is diagnosed with cancer. It is of variable degree which might increase as the disease

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undergoes progression. It is also closely linked to therapy-based co-morbidity.^[4] Oral manifestations of stress include- gingival and periodontal diseases, disorders of temporomandibular joint, burning mouth syndrome, xerostomia, and aphthous ulcers. Chronic exposure to stress may cause a chronic elevation of cortisol levels (stress hormone). These elevated levels cause depression of immunological status. It can be hypothesized that the practice of yoga can help prevent dental and oral diseases.^[5]

Oral cancer is the most common variety of malignancy affecting the oral cavity that is caused by the consumption of tobacco products along with alcohol usage.^[6] Approximately 43% of cancer-related deaths globally are associated with the use of alcohol or tobacco usage, improper dietary habits, lack of physical exercises and infectious conditions.^[7] Regular tobacco use (either as smoked or in its smokeless forms) results in an imbalance between oxidants and anti-oxidants that causes elevation of oxidative stress. This causes an increase in peroxidation of lipids, damage to DNA and an increase in metabolites that result in malignancy development.^[8]

Yoga can influence remission from cancer for a long period. Also, reversal in epigenetic alterations can be achieved by practicing yoga exercises.^[7] It has been thought that the practice of yoga asanas, meditation and pranayamas can decrease carcinogenesis.^[6] A healthy immune status is requisite for anti-cancer activity within the human body. Stress encourages cancer development and growth by reducing a person's immunity.^[9] Various asanas (Yoga postures) have been shown to improve periodontal along with gingival indices due to an increase in salivary human beta-defensin-2 concentration which is an antimicrobial peptide.^[10] Yogic breathing is associated with a decrease in blood pressure, variations in heart rate, reduction in the frequency of breathing and improvement in cognitive activities. Significant reductions in stress levels have been observed alongside a decrease in symptoms.^[11]

Other alternative techniques includes mindfulness-based stress reduction, which was first introduced by Kabat-Zinn (1970). It has been shown to decrease pain, stress and other psychological problems. This method alleviates stress and other behavioral problems using music therapy.^[12]

Yoga along with numerous non-pharmacological behavioral interventional techniques aim at the prevention of cognitive decline. However, this claim often requires an extensive comparative assessment and evaluation.^[13]

This study aimed to assess the impact of Yoga on oral cancer and management of stress.

Methods

This was a prospective questionnaire-based study that included 200 subjects diagnosed with oral squamous cell carcinoma which is commonly termed as 'oral cancer'. The study was conducted in compliance with the protocol; ethical approval was obtained

from the ethical committee of the Nalanda Medical College, Patna, Bihar (Ethical Approval Number – NM/ETH/2020/088) dated 24/07/2018. The subjects participating in the present study provided their informed written consent before taking the survey by signing the consent form. Selected subjects were explained the purpose of this study and were asked to undergo Yoga training for one month. Stress levels were assessed before starting Yoga exercises and one month after practicing the technique using a 10-point questionnaire. Subjects were asked to write their responses ranging from 1 to 4. Questionnaire was as follows:

1. How anxious do you feel after receiving the diagnosis of oral cancer?
2. Does your apprehension increase when you see similar people with the disease?
3. Do you get nightmares during sleep or have difficulty in sleeping?
4. Does your sleep get interrupted?
5. Where do you base your fear levels on a scale of 1 to 4?
6. Are you afraid of lifestyle changes after treatment is over?
7. Do you feel there is a social stigma attached to the disease?
8. Have you tried sharing your fears with close family members and friends?
9. How motivated are you before enrolling for Yoga training?
10. Have you heard previously about the use of yoga therapy in stressful conditions?

All the obtained scores were recorded and mean values calculated for 200 study participants. Unpaired t-test was applied and P value was calculated. A P value of less than 0.05 was considered significant while a value of less than 0.001 was considered extremely significant.

The inclusion criteria of the study were: 1) Subjects clinically and histopathologically diagnosed with oral cancer; 2) No habit of tobacco use at the time of the study; 3) Subjects who have never undergone Yoga training; and 4) Willingness to practice yogic asanas and breathing techniques.

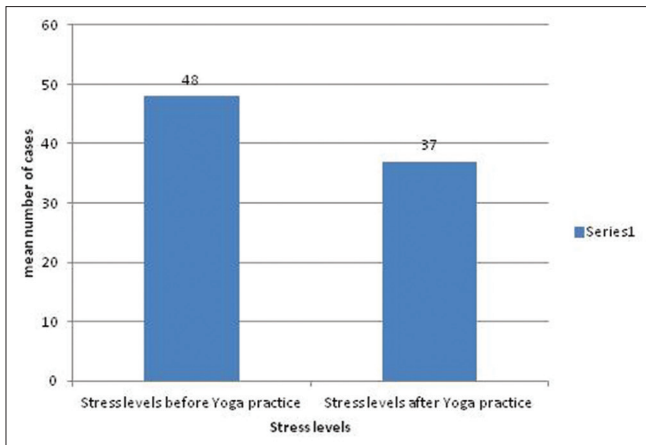
Exclusion criteria of the study included: 1) Person already practicing any form of physical exercise, therapy or Yoga and Any neuromuscular, thyroid or previously diagnosed mental illnesses.

Stress levels were measured before and one month after initiation of Yoga in oral cancer patients using a self-administered questionnaire comprising of 10 questions. Each question was scored from 1 to 4. Grading criteria were as follows:^[14]

Normal range:	25-44
Mild-to-moderate levels:	45-59
Marked-to-severe levels:	60-74
Extreme levels:	75-80

Results and observations

On applying unpaired t-test, it was found that before initiating the practice of Yoga, mean stress scores were 48 ± 0.99 . After



Graph 1: Graph demonstrating mean stress scores before and after the practice of yoga

Table 1: Mean stress scores before and after initiation of Yoga in oral cancer patients

Stress levels before Yoga practice	Stress levels after Yoga practice	P
48±0.99	37±5.2	<0.001

one month of Yoga practice, it was found that mean stress scores decreased to 37 ± 5.2 Graph 1. An extremely significant P value of less than 0.001 was obtained denoting the positive effect of Yoga on stress levels in oral cancer patients [Table 1].

Discussion

The World Health Organization has defined ‘stress’ as – a state of complete mental, physical alongside social well-being. It is not only an absence of disease.^[14] Psychological anxiety and stress is a dominant risk factor with systemic implications. Stress can initiate immunomodulatory pathways alongside maladaptations in behaviors that can manifest in the form of poor sleep, abnormal feeding behavior, and consumption of smoking and alcohol or substance abuse. Stress is known to cause the induction of the sympathetic-adrenal medullary- and hypothalamic-pituitary axis. This causes complex immune-related inflammatory response by elevation of cortisol, adrenaline, dehydro-epiandrosterone and alpha-amylase levels. These bind to DNA receptors like mineralo- and glucocorticoid response elements. This binding initiates transcription of specific genes and new protein synthesis. Stress associated with any form of cancer leads to a negative influence on the overall health of an individual. Stress hormones mainly cortisol along with other adrenal origin hormones contributes to the progression of cancer.^[15]

Bhasin *et al.* (2013), in their study, have demonstrated improvement in mitochondrial function by increasing ATPase and Insulin expression promoting genes and by using NF-κβ associated genetic amplification.^[15] Similarly, Bower *et al.* (2014) also showed a significant decrease in NF-κβ and interferon-related transcriptional factors after a 12-week Yoga practice session

among breast carcinoma patients.^[16] Pal *et al.* (2018) in their analysis recommended the use of Yoga and varied physical activities for reducing stress in such morbid conditions.^[5]

Melissa Adair *et al.* (2018) conducted a study to examine the feasibility of a tailored yoga program in Head and Neck Cancer survivors. Some of the late effects such as mood, symptom burden, and shoulder function improved through the use of yoga. Significant limitations in movement requiring modifications in poses were found. Efficacy measures indicated potential benefit for shoulder range of motion, pain and anxiety.^[17]

Ying Zhang *et al.* (2020) conducted a study to evaluate the Quality of Life (QoL) and investigated the effects of stigma, hope, and social support on QoL among Chinese oral cancer patients. It was concluded that patients with oral cancer suffered from relatively low QoL. Stigma was significantly and negatively associated with QoL, while hope and perceived social support were positively associated with QoL.^[18]

Geetharani Arumugam *et al.* (2020) provided the first evidence for significant efficacy of adjunct yoga-treatment for the attainment of favorable treatment goals for Type 2 Diabetes in rural Indian settings.^[19] Yoga, as a lifestyle intervention has been reported to lead to beneficial health outcomes related to cardiovascular and metabolic disorders including Type 2 Diabetes. Based on its high reported receptivity and cost-effectiveness, Yoga holds a strong potential as a lifestyle management skill in Indian scenario.^[20]

Rajhans *et al.* (2018), in their study, showed a significant association of stress with serum cortisol levels and stress scores with periodontal indices. This can be attributed to decreased secretion on Immunoglobulin A and –G secretion and neutrophil functions, thereby reducing periodontal disease.^[13] Twai *et al.* (2016) evaluated salivary levels of interleukins such as IL-8, -1β and monocyte chemoattractant protein-1 (MCP-1) obtained from twenty subjects. There was a consistent reduction in IL-8 at various periods tested while IL-1β demonstrated a significant decrease at 15 and 20 minutes time intervals with a P value less than 0.05. MCP-1 showed only a marginal decrease at 5 and 20 minutes intervals. A significant correlation was observed between salivary MCP-1 levels and symptoms of PTSD which include anxiety and depression. This study showed that a twenty-minute session of Yoga breathing causes a reduction in pro-inflammatory cytokine levels.^[9]

Dhonani and Chouksey (2016) in their case-control study found that 48% of study participants attributed their poor oral health to stress. This was evaluated using DMFT score which ranged between 1 to 10 in 80% of subjects and an Oral Hygiene Index Score from 3-4. 26% of the study participants had a positive family history of cancer cases and a stress-related disorder was found to have statistical significance.^[21]

Balasubramanian (2015) in their liquid chromatographic study analysis of saliva samples which was followed by Western

Blotting demonstrated a significant increase in Mucin-7, prolactin-inducible protein, cysteine-rich secretory protein 3 and Deleted in malignant benign tumor-1 (DMBT-1) after performing yoga exercises. DMBT-1 has been shown to code for gp340 salivary agglutinin and also, plays an important role in the differentiation of epithelial cells. Thus, it is hypothesized to play an important and significant role in the causation and progression of oral cancer.^[22]

Inflammatory processes are associated with various oral conditions. In such pathologies, inflammatory background can transform them into malignancies. Psychological stressors of long duration activates the hypothalamic-pituitary axis that can cause activation of mediators of inflammation such as COX-2, TNF- α , IL- β and IL-6 which in turn can activate factors such as STAT-3 and NF- κ B which are involved in the progression of certain tumors to malignant entities. Endorphins are naturally occurring opioids or neuropeptides that are produced by the anterior pituitary gland in response to stressors via the release of corticotrophin-releasing hormone (CRH) from the hypothalamus. There are three types of endorphins: a) Dynorphin; b) Enkephalins; and c) β -endorphins. β -endorphin releases on binding to μ , κ and δ receptors localized on peripheral nerves. Processes like- Yoga, acupuncture, meditation, Pranayama, physical activities like running, any form of sports cause endorphin release. The endorphins especially the β -endorphin possess anti-carcinogenic potential by activation of Granzyme-B, Perforin, IFN- γ from natural killer (NK) cells, neutrophils and dendritic cells. Also, NF- κ B causes inactivation of p53, a tumor suppressor gene.^[23]

Yoga exercises involving breathing exercises result in the production of theta brain waves that regulated neurotrophic growth factor (NGF).^[24] This Neurotrophic Growth Factor or NGF directly causes activation of IL-6 which regulates the STAT-3 and NF- κ B transcription pathway. Anti-NGF reduces the proliferation of lesional cells. Pranayama or Yogic breathing exercises have been demonstrated to regulate Neurotrophic Growth Factor thus, decreasing chances of malignancy.^[25-28]

Implications for primary care

There have been significant advancements in the field of cancer treatment. Despite this, there is a continuous increase in the number of oral cancer cases. Thus, there is a requirement of integration of alternative medicine with modern medicine or an integrative cost-effective approach for management as well as treatment of oral cancer. Conventional modality of cancer treatment involves surgical intervention which is followed by radiation therapy or chemotherapy. This results in several problems which include- a poor quality of life and high recurrence potential. However, a large amount of specific data based upon knowledge levels and awareness of oral cancers and the overall efficiency of various non-pharmacological methods in the general population may prove helpful in planning cost-effective strategies for prevention and disease treatment.

Yoga contributes to the prevention and long-term remission from cancer. Physical exercise has the ability to kill the emerging cancerous cells naturally and reduces the chances of carcinogenesis. Yoga helps in decreasing the inflammatory response and increase the immunity that helps to achieve the good oral health.^[29] Scientific evidence supports the belief that yoga benefits physical and mental health via down-regulation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system.^[30] Healthy persons at higher genetic risk of cancer may also be drawn to meditation to reduce environmental and life style risk factors and to control anxiety and stress.^[31]

Conclusion

The present study included a questionnaire-based survey to assess the quality of life in oral cancer patients. In this study, it was demonstrated that alternative therapy like the practice of Yoga is effective in reducing stress in subjects with oral cancer. Practicing yoga enhances the coping ability of patients. These measures change the hopeless and helpless attitude to the active fighting spirit. Yoga reduces the stress associated with the diagnosis as well as treatment of cancer. Thus, it can be concluded that yoga can play an important and effective role in reducing stress levels in diseased persons.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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