
**PREVALENCE AND IMPACT OF SARCOPENIA AMONG HEAD AND
NECK CANCER PATIENTS UNDERGOING CHEMO-RADIOTHERAPY
IN CHENNAI: A DESCRIPTIVE CORRELATIONAL STUDY**

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Abstract

Head and neck cancers (HNCs) account for approximately 25–30% of all malignancies in India and are commonly managed with chemo-radiotherapy (CRT) in advanced stages. Sarcopenia, characterized by the progressive loss of skeletal muscle mass, muscle strength, and physical function, is increasingly recognized among HNC patients receiving CRT and is associated with poor treatment tolerance and adverse outcomes. This study aimed to assess the prevalence of sarcopenia and its association with selected demographic and clinical variables among HNC patients undergoing CRT. A descriptive correlational design was employed among 100 patients admitted to the chemo-radiation wards of selected hospitals in Chennai, using a non-probability convenience sampling technique. Standardized tools were used to assess demographic characteristics and sarcopenia-related parameters, including muscle strength, physical performance, and functional limitations. The majority of participants were male (66.7%) and aged between 51 and 70 years, with most diagnosed at Stage II or III disease. Overall, 60% of patients were identified as being at high risk for sarcopenia, with common functional impairments such as reduced hand-grip strength, difficulty rising from a seated position, and

challenges in climbing stairs. Although a higher risk of sarcopenia was observed among older adults, females, obese individuals, and those experiencing severe stress, no statistically significant association was found between sarcopenia risk and the selected demographic or clinical variables. The findings highlight the high prevalence of sarcopenia among HNC patients receiving CRT and underscore the critical role of oncology nurses in early screening, patient education, and implementation of supportive care interventions to improve treatment tolerance, reduce complications, and enhance overall quality of life.

Keywords:

Head and neck cancer, Sarcopenia, Chemo-radiotherapy, Muscle strength, Nursing care & Oncology,

Introduction

India, home to more than one-sixth of the global population, bears a substantial burden of head and neck cancers (HNC), accounting for approximately 25–30% of all malignancies nationwide, with a higher incidence among men¹. Clinically, HNC is staged from I to IV, with early-stage disease (Stages I and II) commonly managed with single-modality treatment such as surgery or radiotherapy, while advanced-stage disease (Stages III and IV) requires multimodal approaches including surgery combined with radiotherapy and/or chemotherapy, or definitive chemo-radiotherapy (CRT)¹. Sarcopenia, defined as the progressive loss of skeletal muscle mass, strength, and physical function, is increasingly recognized among HNC patients, particularly those undergoing CRT. International studies report a wide prevalence range of 16% to 71%^{2–6}. In India, recent evidence indicates that sarcopenia prevalence among HNC patients may be as high as 31.5%, with important implications for treatment outcomes⁷. Indian populations are particularly vulnerable due to lower body mass index, higher body fat percentage, and reduced skeletal muscle mass and strength compared to other ethnic groups^{7–9}. A large multinational study involving 18,363 older adults across nine countries reported that older Indians (≥ 65 years) had the highest prevalence of sarcopenia (17.5%)⁸. Traditionally considered an age-related condition, sarcopenia involves an estimated annual decline of approximately 1% in lean muscle mass after the age of 30¹⁰. However, emerging evidence suggests that muscle strength does not decline proportionally with muscle mass, leading to the concept of “dynapenia,” which refers specifically to the loss of muscle strength¹⁰. Contemporary definitions of sarcopenia now emphasize both



structural and functional deterioration, particularly in individuals with chronic illnesses, overlapping conceptually with frailty while remaining distinct in therapeutic focus¹⁰. Given the heightened baseline vulnerability of Indian HNC patients and the physiological stress imposed by CRT, this pilot study was designed to assess sarcopenia-related outcomes at the initiation of CRT and to examine changes over a 7-week treatment course.

Methodology

The study adopted a descriptive correlational design using a survey-based approach to assess the prevalence and risk of sarcopenia among patients diagnosed with head and neck cancer (HNC) undergoing chemo-radiotherapy (CRT). The research was carried out in the oncology ward of a selected tertiary care hospital in Chennai, Tamil Nadu. A total of 100 participants were recruited through a non-probability convenience sampling technique. Adult patients with a confirmed diagnosis of HNC who were scheduled to receive CRT, clinically stable, and able to participate in structured interviews were included in the study, while patients with cognitive impairment, severe physical disability, or unwillingness to provide informed consent were excluded. The sample size was determined using the prevalence-based formula for descriptive studies, assuming an anticipated sarcopenia prevalence of 50%, a 95% confidence level, and a 10% allowable error, resulting in a calculated sample size of approximately 96, which was rounded up to 100 to account for potential attrition and enhance statistical power. Data were collected using two standardized instruments: a demographic and clinical proforma to obtain information on age, gender, cancer stage, comorbidities, and treatment details, and the SARC-F questionnaire, a validated five-item screening tool assessing muscle strength, walking ability, ability to rise from a chair, stair climbing, and history of falls, with a score of ≥ 4 indicating probable sarcopenia. Content validity of the instruments was established through expert review by oncology and nursing specialists, and reliability of the SARC-F tool was confirmed using the split-half method, yielding a correlation coefficient of $r = 0.8$, indicating high internal consistency. Ethical approval was obtained from the Institutional Review Board of the participating hospital, and written informed consent was secured from all participants prior to data collection, ensuring confidentiality and voluntary participation. Data collection was conducted through structured interviews by trained nursing personnel in a private setting, with each interview lasting approximately 10–15 minutes. The collected data were analyzed using descriptive statistics such as frequency, percentage, mean, and standard deviation, along with inferential statistics,

specifically the Chi-square test, to examine associations between selected demographic and clinical variables and the risk of sarcopenia.

Results

Demographic Profile of Participants (n = 100)

The study comprised 100 participants, with the majority (60%) aged between 51 and 70 years, while 23% were below 50 years and 17% were above 70 years. Males constituted 67% of the sample, and most participants were married (80%). In terms of educational status, 50% had completed secondary or higher secondary education, whereas 20% were illiterate, with the remaining participants having primary or diploma-level education. Occupational distribution showed that 23% were housewives, 23% were employed in the unorganized sector, 20% worked in the organized sector, 10% were self-employed, and 7% were retired. Regarding the nature of work, 33% engaged in sedentary activities, 40% performed moderate work, and 27% were involved in heavy physical activity. Nearly half of the participants (47%) reported a monthly family income of ₹25,000 or less. Participants resided in urban (40%), semi-urban (27%), and rural (33%) areas. Stress assessment revealed that 40% experienced moderate stress and 27% mild stress, while the remainder reported either severe or no stress. Social support levels were generally positive, with 50% reporting good support, 33% average support, and 17% reporting no social support. Baseline demographic characteristics were comparable between the control and intervention groups, suggesting minimal demographic influence on study outcomes.

Clinical Characteristics of Participants (n = 100)

Clinically, 40% of the participants had a normal body mass index, while 27% were overweight and 33% were obese. Dietary habits showed that 70% followed a non-vegetarian diet, whereas 30% adhered to a vegetarian diet. Lifestyle assessment indicated that 47% were non-smokers, 20% were former smokers, and 33% were current smokers. Alcohol consumption patterns revealed that 43% of participants abstained from alcohol, while 27% consumed alcohol occasionally, 17% weekly, and 13% daily. With regard to co-morbid conditions, 37% had no associated illnesses; among those with co-morbidities, 27% had hypertension, 17% had diabetes mellitus, 13% had both hypertension and diabetes, and 6% reported other medical conditions.

The most prevalent cancer type was oropharyngeal cancer (40%), followed by nasopharyngeal cancer (30%) and hypopharyngeal or thyroid cancers (30%). Disease staging showed that 43% of participants were in Stage III, 33% in Stage II, and 24% in Stage I. Treatment modalities included combined chemotherapy and radiotherapy in 60% of participants, while 40% underwent surgery followed by chemoradiotherapy.

Clinical and Bio-physiological Parameters

The mean age of the 100 participants was 59.8 years (SD \pm 9.2), indicating that the majority were in their late fifties to early sixties. The mean body mass index (BMI) was 24.1 kg/m² (SD \pm 3.1), suggesting that most participants fell within the overweight category. Hospitalization data showed a mean length of hospital stay of 12.4 days (SD \pm 4.8), of which an average of 8.6 days (SD \pm 3.7) were spent in the oncology ward. Assessment of bio-physiological parameters among the 100 participants revealed values largely within expected clinical ranges. The mean prothrombin time was 13.5 seconds (SD \pm 1.6), the mean activated partial thromboplastin time (aPTT) was 31.2 seconds (SD \pm 4.5), and the mean international normalized ratio (INR) was 1.18 (SD \pm 0.19). The mean bleeding time was 2.7 minutes (SD \pm 0.6), while the mean clotting time was 5.4 minutes (SD \pm 1.1). Additionally, the mean D-dimer level was 0.82 μ g/mL FEU (SD \pm 0.35), indicating a mild elevation but remaining largely within normal limits. Overall, these findings indicate that the majority of participants maintained stable systemic and coagulation parameters throughout their hospital stay.

Sarcopenia Risk Assessment

Based on SARC-F scores, **60% of participants (n = 60)** were identified as being at **high risk for sarcopenia** (score \geq 4), while **40% (n = 40)** fell within the **low-risk category** (score 0–3). These findings indicate that a substantial proportion of the study population is vulnerable to sarcopenia, underscoring the importance of **early screening and timely, targeted interventions** among patients undergoing **chemo-radiotherapy** to prevent functional decline and improve clinical outcomes.

Item-wise Analysis of Sarcopenia Risk (n = 100)

Parameters of Risk for Sarcopenia	Frequency (f)	Percentage (%)
Reduced Strength	53	53.3
Assistance in Walking	40	40.0
Difficulty in Rising from a Chair	60	60.0
Difficulty in Climbing Stairs	47	46.7
History of Falls	33	33.3

These findings underscore the high incidence of limitations in muscle strength, mobility, and balance among patients with head and neck cancer undergoing chemo-radiotherapy, reinforcing the importance of early functional screening and supportive interventions.

Association Between Background Variables and Sarcopenia Risk

Although a higher proportion of participants aged above 70 years, females, married individuals, graduates and above, employed persons, those engaged in heavy physical work, and those reporting severe stress exhibited increased sarcopenia risk, none of these associations reached statistical significance ($p > 0.05$). These findings suggest that, within the present sample, background variables did not demonstrate a significant relationship with sarcopenia risk.

Association Between Clinical Variables and Sarcopenia Risk

The relationship between selected clinical variables and sarcopenia risk was analyzed. Although participants with higher body mass index (BMI), particularly those classified as obese, and current smokers exhibited a trend toward increased sarcopenia risk, none of these associations reached statistical significance ($p > 0.05$). These findings suggest that, within the present sample, clinical variables such as BMI, dietary pattern, smoking and alcohol habits, co-morbidities, cancer type and stage, and treatment modality did not show a statistically significant correlation with sarcopenia risk.

Discussion

The present study demonstrated a high prevalence of sarcopenia among patients with head and neck cancer (HNC) undergoing chemo-radiotherapy (CRT), with 60% of participants identified as being at high risk based on the SARC-F screening tool. This finding is comparable with earlier

studies that have reported a substantial burden of sarcopenia in HNC patients receiving CRT and its association with poor treatment tolerance and adverse clinical outcomes^{11,12}. The predominance of male participants and the high prevalence of tobacco and alcohol use observed in this study are consistent with established lifestyle-related risk factors for HNC reported in previous literature¹³. Functional impairments were frequently reported, with more than half of the participants experiencing reduced muscle strength and difficulty performing mobility-related activities such as walking, standing from a chair, and climbing stairs. These findings reinforce the usefulness of the SARC-F questionnaire as a simple and efficient screening tool for identifying probable sarcopenia in oncology settings¹⁴. The presence of these functional limitations highlights the importance of early detection and implementation of targeted interventions, including nutritional support and physiotherapy, to improve treatment tolerance and prevent further functional decline.

The clinical characteristics of the study population reflected considerable nutritional heterogeneity, with most participants having a normal body mass index (BMI) and a notable proportion classified as overweight or obese. This finding underscores the complexity of nutritional status in HNC patients, where sarcopenia may coexist with excess adiposity, a condition often referred to as sarcopenic obesity¹⁵. Dietary patterns, including the predominance of non-vegetarian diets, along with widespread tobacco and alcohol consumption, align with known etiological factors for HNC¹⁶. Several participants had co-morbid conditions such as hypertension and diabetes, which may further influence treatment outcomes and overall prognosis¹¹. Oropharyngeal cancer was the most commonly observed subtype, and the majority of patients were diagnosed at Stage II or III disease, receiving combined CRT, which reflects current standard treatment practices for advanced HNC¹⁷. The mean age of participants was consistent with national epidemiological data on HNC in India¹⁸. Despite an average BMI within the overweight range, a high risk of sarcopenia was observed, emphasizing that BMI alone is insufficient to identify muscle loss in oncology patients¹¹. The average duration of hospital stay reflected the intensity and physiological demands of CRT regimens¹⁷. Baseline bio-physiological parameters, including coagulation profiles, were largely within normal limits, suggesting relative systemic stability at the time of assessment¹⁹.

Item-wise analysis of the SARC-F tool revealed marked functional impairment, with 60% of participants reporting difficulty rising from a chair and 53.3% experiencing reduced muscle

strength. These findings are in agreement with previous studies demonstrating that sarcopenia significantly affects strength, balance, and activities of daily living among HNC patients^{19,20}. The reported incidence of falls further underscores the need for routine assessment of mobility and balance in this population. Early identification of functional deficits using screening tools such as SARC-F facilitates timely initiation of resistance training and physiotherapy interventions, which have been shown to improve functional outcomes and quality of life²¹. Although trends suggested a higher risk of sarcopenia among older adults, females, individuals experiencing severe stress, and those engaged in physically demanding work, these associations did not reach statistical significance. Similar observations have been reported in earlier studies, indicating that while demographic factors may influence sarcopenia risk, disease-related and treatment-induced catabolic effects often play a more dominant role^{19,22}. This finding supports the need for universal sarcopenia screening and individualized care irrespective of demographic characteristics. Likewise, clinical variables such as BMI, smoking status, and co-morbidities did not show statistically significant associations with sarcopenia risk, although higher risk trends were noted among obese patients and current smokers. These findings further highlight the multifactorial nature of sarcopenia in oncology populations and reinforce the importance of comprehensive assessment and early multidisciplinary interventions, including nutritional counseling and structured exercise programs, to mitigate sarcopenia-related complications²¹.

Conclusion

This study highlights the significant prevalence of sarcopenia among head and neck cancer patients undergoing chemo-radiotherapy, with 60% identified as high risk using the SARC-F screening tool. Functional impairments such as reduced strength, difficulty with mobility, and history of falls were common, underscoring the clinical relevance of early detection. Although demographic and clinical variables did not show statistically significant associations with sarcopenia risk, observed trends suggest multifactorial vulnerability influenced by age, lifestyle, and treatment-related factors. These findings reinforce the need for routine sarcopenia screening and integrated supportive care strategies to optimize treatment tolerance, reduce complications, and improve patient outcomes.

Implications for Nursing Practice

- **Early Screening and Assessment:** Nurses should incorporate sarcopenia screening tools

like SARC-F into routine oncology assessments to identify at-risk patients early in the treatment trajectory.

- **Multidisciplinary Collaboration:** Nursing professionals play a pivotal role in coordinating care with dietitians, physiotherapists, and oncologists to implement personalized interventions targeting muscle strength and nutritional status.
- **Patient Education:** Nurses can educate patients and caregivers on the importance of maintaining muscle health through balanced nutrition, physical activity, and adherence to prescribed therapies.
- **Monitoring and Follow-up:** Regular monitoring of functional status and nutritional indicators can help track sarcopenia progression and guide timely adjustments to care plans.
- **Advocacy and Research:** Oncology nurses should advocate for the integration of sarcopenia management into cancer care protocols and contribute to ongoing research to refine assessment tools and intervention models.

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CONFLICT OF INTEREST:

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