

Editorial

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Palliative Nutritional Care for Cancer Patients

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INTRODUCTION

Palliative care is of paramount importance for patients suffering from life threatening incurable diseases such as AIDS, cancer, end stage renal disease and end stage chronic illnesses.¹ In the Indian healthcare system, palliative care is a developing area and is not well represented in the health sector. Medical advancements, cancer survivors are leading a longer and better quality of life but still there is a gap between availability of palliative care centers and assistance from healthcare professionals.²

PREVALENCE OF CANCER

International Agency for Research on Cancer (GLOBOCAN project, 2012) reported approximately 14.1 million new cancer cases and 8.2 million cancer deaths worldwide. Out of these there were 1015,000 cancer cases and 683,000 cancer deaths in India.³ It has been predicted that the number of cancer deaths in India will rise from 683,000 in 2012 to 1.2 million by 2035.³ The World Health Organization (WHO) estimates 1 million new cancer patients yearly in India with approximately 750,000 of them requiring palliative care.¹

CANCER CACHEXIA AND ITS IMPACT ON NUTRITION

In cancer, with disease progression, a patients' nutritional status is progressively impacted. The multiple metabolic changes and nutritional depletion may affect body composition, functional capability, psychological state and response to cancer treatment.⁴ Gastrointestinal and head and neck cancers are widely associated with cachexia. However the same tumor site may exhibit cachexia of varying grade or be absent in different patients. Approximately 50% of cancer patients progress to cachexia.⁵

Cancer cachexia was defined as "a multifactorial syndrome defined by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment. Its pathophysiology is characterized by a negative protein and energy balance driven by a variable combination of reduced food intake and abnormal metabolism".⁶ There are three stages of cancer cachexia: pre-cachexia, cachexia and refractory cachexia. In the precachexia stage patients experience less than 5% pre-treatment weight loss whilst once they progress to refractory cachexia stage mortality is foreseen in approximately three months.⁶

During cancer, patients nutritional status is hindered due to tumor induced alterations in metabolism.⁷ Patients also suffer from tumor related problems and chemo-radiotherapy induced dysphagia, mucositis, xerostomia, nausea, vomiting, sometimes chewing and swallowing difficulties.⁸ The capacity to endure chemo-radiotherapy treatment and fight the disease is adversely affected by cachexia.⁹ Alongside the minimum 10% increased in basal metabolic rate,¹⁰ anorexia is one of the key factors among cachexia patients leading to weight loss.¹¹ Body

weight loss during cachexia is due to skeletal muscle as well as adipose tissue wasting.¹² The wasting of skeletal muscle leads to deranged immune system and mobility issues.¹³ As weight loss progress to 30% of pre treatment body weight, death becomes inevitable.¹⁴

CONSEQUENCES OF MALNUTRITION

Malnutrition is described as a clinical condition of imbalance of energy, protein, and other nutrients. This leads to significant negative impact on body composition, function, and clinical treatment.^{15,16} Malnutrition has been documented globally among 30-80% of cancer patients.¹⁷⁻¹⁹ The consequences of malnutrition may include an increased risk of morbidity, decreased response and tolerance to treatment, a decline in quality of life, higher health-care costs and reduced survival.²⁰⁻²² Reported dietary intake of advanced cancer patients suggests that their total calorie intake is 1610±686 kcal/d which is 4-53 kcal/kg body weight/d.²³ Kumar et al also documented a calorie deficit of approximately 250-400 kcal/d among weight losing cancer patients.¹⁸ Anemia is commonly reported in advanced cancer patients, leading to altered energy homeostasis and reduction in physical activity.²⁴ Advanced cancer patients have deficiency of essential micronutrients like zinc, selenium, vitamin C and vitamin E, which support body's immune response.²⁵⁻²⁸

NUTRITION SCREENING AND ASSESSMENT OF CANCER PATIENTS

Nutritional screening and body weight measurements assists in nutritional status evaluation of cancer patient's non-invasively.²⁹ It helps to identify malnourished patients or those who are at risk of developing malnutrition. Patients' nutritional status can be monitored and a nutritional care plan can be developed. Body composition machine can be used to assess the body weight, body fat percentage and muscle mass of ambulatory patients.³⁰ A range of subjective and objective measures have been used for nutritional screening like 24-hour dietary recall, food frequency questionnaire (FFQ), Patient Generated-Subjective Global Assessment (PG-SGA). FFQ and 24 hour dietary recall help to record patients' frequency of individual foods consumption and information on eating patterns.³¹ PG-SGA questionnaire aids to determine the deterioration or improvement in their nutritional status.³² It has been recommended as the nutrition assessment tool for patients with cancer by Oncology Nutrition Dietetic practice group of the American Dietetic Association.³²

QUALITY OF LIFE ASSESSMENT FOR CANCER PATIENTS

Cancer and treatment-induced changes in metabolism can lead to alterations in physiological and psychological functions. This may lead to low quality of life and consequently adversely influence patients' nutritional status.³³ Various tools for quality of life assessment have been developed; European Organization for Research and Treatment of Cancer quality-of-life core questionnaires (EORTC QLQ-C30), the Functional Assessment of Cancer Therapy-General (FACT-G), Functional Living Index cancer questionnaire (FLIC), Spitzer Quality of Life Index (QLI), Rotterdam Symptom Check List (RSCL), the Medical Outcome Study 36-item short form (MOS SF-36), EuroQol (EQ-5D), the Cancer Rehabilitation Evaluation System (CARES) and the Symptom Distress Scale.³⁴ The European Organization for Research and Treatment of Cancer-Quality of Life (EORTC QLQC30) questionnaire is a validated self assessment instrument used for assessing quality of life in patients with cancer and most widely used tool.^{34,35} Studies involving malnourished cancer patients suggest a strong association between body weight loss and fatigue with poor quality of life, functional impairment and early mortality.^{36,37}

EXERCISE FOR THE MANAGEMENT OF CANCER RELATED FATIGUE

Development of cachexia may lead to decline in daily motor activities and increased fatigue. Endurance activity has been noted to decrease self reported cancer related fatigue.³⁸ Clinical Practice Guidelines on Cancer Cachexia in Advanced Cancer Patients by European Palliative Care Research Collaborative 2010 strongly recommends physical activity in the management of cancer related cachexia.³⁹ It may help to enhance the immune function and reduce inflammatory responses.⁴⁰ Physical activity questionnaire like Global Physical Activity Questionnaire (GPAQ) and Karnofsky Performance Score (KPS) are reliable tools to assess patients physical functioning.^{41,42} A study on 188 advanced palliative cancer patients who were enrolled under a 12-week physical activity program (mainly walking) observed strong improvement in fatigue levels and maintenance of body weight.⁴³ Another study, observing daily physical activity of advanced cancer patients showed significant correlation between activity levels and different domains of quality of life.⁴⁴

NUTRITION INTERVENTION AND ITS BENEFITS

Oral Nutritional Supplements (ONS) containing protein, fat, carbohydrates, vitamins and minerals can provide a convenient and practical way of providing adequate nutritional support to distinct patient categories. Consumption of energy intake of

28.7-34 kcal/kg ideal body weight/day and protein intake of 1.4 g/kg ideal body weight/day in cancer cachexia patients can help in weight maintenance.^{45,46} Patients experiencing weight-loss due to cancer cachexia can have better quality of life if their weight is stabilized compared to weight losing patients.⁴⁷

For management of cachexia patients, a multimodal therapy approach has been proposed.³⁹ A multimodal therapy involves nutritional support, anti-inflammatory and anemia therapy, encouraging physical activity, oral nutritional supplement intake and multidisciplinary teamwork approach in order to improve nutritional status of the patient.⁴⁸ According to a recent systematic review, malnourished cancer patients, receiving nutritional counseling along with or without ONS resulted in nutritional status improvements.⁴⁹ Body weight increase in cancer patients consuming ONS leads to maintenance of lean body mass and better quality of life.⁵⁰ Better nutritional status among head and neck as well as gastrointestinal tract cancer patients consuming ONS compared to patients receiving standard care has been reported earlier.⁵¹ A recent nutritional intervention study among low socio-economic malnourished head & neck patients, reported increased percentage body weight and improved biochemical indices compared to control patients on daily diets.⁸ The patients were given a diet chart consisting of locally available and acceptable low cost nutritional food items, which could be easily adhered with.⁸ Another ongoing intervention study is testing the acceptability and impact of a natural nutritional flour mix (IAtta) on improving nutritional status of cachexic female cancer patients.⁵² Educating caregivers about employing affordable nutritious local foods among malnourished cancer patients could help in correcting their nutritional status with minimal training. This is irrespective of their financial status as well as their area of residence.⁵² Baldwin et al, in the past concluded that nutritional intervention among advanced malnourished patients was significantly correlated with better quality of life.⁵³ Furthermore, nutritional supplements containing protein, fat, carbohydrates, vitamins and minerals can provide a convenient and practical way of compensating their inadequate daily diets. Dieticians should be actively involved in providing patients' individualized nutritional counseling keeping their preferences, ethnicity and cultural restrictions in mind.⁵⁴ During nutritional counseling sessions, attention should be paid to the kind of treatment patient is undergoing as chemo-radiotherapy side effects impact food intake. Enteral, parenteral, total parenteral nutrition feeding techniques should be considered in patients who are unable to take oral foods.⁵⁴ Oncologists and clinical nutrition experts need to work in collaboration to optimally manage malnutrition among cancer patients.

CONCLUSION

Therefore, palliative cancer patients' nutritional status should be regularly monitored and supplementation should be recommended to compensate deficit calorie intake. We can then manage body weight loss and predict improved treatment outcome leading to a better quality of life. Patients in palliative care should be counseled for nutritional intake according to their individual needs and food preferences.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. Maroju N, Kate V, Ananthkrishnan N. *An overview of the Indian perspective on palliative care with particular reference to nutrition and diet*. In: Preedy V, ed. *Diet and nutrition in palliative care*. 1st ed. US: Taylor & Francis group: CRC Press, 2011: 133-143.
2. Suhag V, Bs S, Singh A, et al. The oncology scenario in India: lots of gaps. *Glob J Med Res*. 2015; 15(2).
3. Ferlay J, Soerjomataram I, Ervik M, et al. GLOBOCAN 2012 v1.0, Cancer incidence and mortality worldwide: IARC Cancer Base No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available at: <http://globocan.iarc.fr> 2012; Accessed January 27, 2016.
4. Doyle N, Shaw C. *Cancer in the twenty-first century*. In: Shaw, C, ed. *Nutrition and cancer*. 1st ed. UK: Wiley-Blackwell. 2011: 1-12.
5. Tisdale M. Mechanisms of cancer cachexia. *Physiological Reviews*. 2009; 89(2): 381-410. doi: [10.1152/physrev.00016.2008](https://doi.org/10.1152/physrev.00016.2008)
6. Fearon K, Strasser F, Anker SD, et al. Definition and classification of cancer cachexia: an international consensus. *The Lancet Oncology*. 2011; 12(5): 489-495. doi: [10.1016/S1470-2045\(10\)70218-7](https://doi.org/10.1016/S1470-2045(10)70218-7)
7. DeWys WD. *Weight loss and nutritional abnormalities in cancer patients: incidence, severity and significance*. In: Calman KC,

- Fearon KC, eds. *Clinics in oncology*. London: Saunders, 1986; 5(2): 251-261.
8. Bhattacharjee A, Bahar I, Saikia A. Nutritional assessment of patients with head and neck cancer in North-East India and dietary intervention. *Indian Journal of Palliative Care*. 2015; 21(3): 289. doi: [10.4103/0973-1075.164889](https://doi.org/10.4103/0973-1075.164889)
9. Theologides A. Cancer cachexia. *Cancer*. 1979; 43(Suppl 5): 2004-2012.
10. Young VR. Energy metabolism and requirements in the cancer patient. *Cancer Research*. 1977; 37: 2336-2347.
11. Dhanapal R, Saraswathi TR, Rajkumar NG. Cancer cachexia. *Journal of Oral Maxillofacial Pathology*. 2011; 15: 257-260.
12. Tisdale MJ. Cachexia in cancer patients. *Nature Reviews Cancer*. 2002; 2: 862-887. doi: [10.1038/nrc927](https://doi.org/10.1038/nrc927)
13. MacDonald N, Easson AM, Mazurak VC, et al. Understanding and managing cancer cachexia. *Journal of the American College of Surgeons*. 2003; 197: 143-161. doi: [10.1016/S1072-7515\(03\)00382-X](https://doi.org/10.1016/S1072-7515(03)00382-X)
14. Tisdale MJ. Tumor-host interactions. *Journal of Cell Biochemistry*. 2004; 93: 871-877.
15. Lochs H, Allison SP, Meier R, et al. Introductory to the ESPEN guidelines on enteral nutrition: terminology, definitions and general topics. *Clin Nutr*. 2006; 25: 180-186. doi: [10.1016/j.clnu.2006.02.007](https://doi.org/10.1016/j.clnu.2006.02.007)
16. Muscaritoli M, Anker SD, Argilés J, et al. Consensus definition of sarcopenia, cachexia and pre-cachexia: joint document elaborated by Special Interest Groups (SIG) cachexia-anorexia in chronic wasting diseases and nutrition in geriatrics. *Clin Nutr*. 2010; 29(2): 154-159. doi: [10.1016/j.clnu.2009.12.004](https://doi.org/10.1016/j.clnu.2009.12.004)
17. von Haehling S, Anker S. Cachexia as a major underestimated and unmet medical need: facts and numbers. *Journal of Cachexia Sarcopenia Muscle*. 2010; 1(1): 1-5. doi: [10.1007/s13539-010-0002-6](https://doi.org/10.1007/s13539-010-0002-6)
18. Kumar N, Kazi A, Smith T, et al. Cancer cachexia: traditional therapies and novel molecular mechanism-based approaches to treatment. *Current Treatment Options in Oncology*. 2010; 11(3-4): 107-117. doi: [10.1007/s11864-010-0127-z](https://doi.org/10.1007/s11864-010-0127-z)
19. Paccagnella A, Morassutti I, Rosti G. Nutritional intervention for improving treatment tolerance in cancer patients. *Current Opinion in Oncology*. 2011; 23(4): 322-330. doi: [10.1097/CCO.0b013e3283479c66](https://doi.org/10.1097/CCO.0b013e3283479c66)
20. Grant M, Rivera L. Impact of dietary counselling on quality of life in head and neck patients undergoing radiation therapy. *Qual Life Res*. 1994; 3: 77-78.
21. Ottery FD. Definition of standardized nutritional assessment and interventional pathways in oncology. *Nutrition*. 1996; 12(Suppl 1): S15-S19.
22. Nitenberg G, Raynard B. Nutritional support of the cancer patient: issues and dilemmas. *Crit Rev Oncol Hematol*. 2000; 34: 137-168.
23. Hutton JL, Martin L, Field CJ, et al. Dietary patterns in patients with advanced cancer: implications for anorexia-cachexia therapy. *American Journal of Clinical Nutrition*. 2006; 84: 1163-1170.
24. Bruera E, Sweeney C. Cachexia and asthenia in cancer patients. *Lancet Oncology*. 2000; 1: 138-147. doi: [10.1016/S1470-2045\(00\)00033-4](https://doi.org/10.1016/S1470-2045(00)00033-4)
25. Balasubramanian N, Subramanian S, Sekar N, Bhuvaramurthy V, Govindasamy S. Involvement of plasma copper, zinc and cadmium in human carcinoma of uterine cervix. *Medical Oncology*. 1994; 11(3-4): 147-148. doi: [10.1007/BF02999866](https://doi.org/10.1007/BF02999866)
26. Goyal M, Kalwar A, Vyas R, Bhati A. A study of serum zinc, selenium and copper levels in carcinoma of esophagus patients. *Indian Journal of Clinical Biochemistry*. 2006; 1(1): 208-210. doi: [10.1007/BF02913100](https://doi.org/10.1007/BF02913100)
27. Naidu M, Suryakar A, Swami S, Katkam R, Kumbar K. Oxidative stress and antioxidant status in cervical cancer patients.

Indian Journal of Clinical Biochemistry. 2007; 22(2): 140-144.

28. Singh P, Kapil U, Shukla NK, Deo S, Dwivedi SN. Association between breast cancer and vitamin C, vitamin E and selenium levels: results of a case-control study in India. *Asian Pacific Journal of Cancer Prevention*. 2005; 6(2): 177-80.

29. Tchekmedyian NS. Clinical approaches to nutritional support in cancer. *Current Science*. 1993; 5: 633-638.

30. Dehghan M, Merchant A. Is bioelectrical impedance accurate for use in large epidemiological studies? *Nutrition Journal*. 2008; 7: 26. doi: [10.1186/1475-2891-7-26](https://doi.org/10.1186/1475-2891-7-26)

31. Persson C. Improved nutritional support in cancer patients. Acta Universitatis Upsaliensis, Faculty of Medicine. 2002. Available at: <http://www.diva-portal.org/smash/get/diva2:161230/FULLTEXT01.pdf>

32. McCallum PD, Polisea CG. The Clinical Guide to Oncology Nutrition. Chicago: The American Dietetic Association, 2000.

33. Marin Caro MM, Laviano A, Pichard C. Impact of nutrition on quality of life during cancer. *Current Opinion Clinical Nutrition Metabolism Care*. 2007; 10: 480-487.

34. Lis CG, Gupta D, Lammersfeld CA, Markman M, Vashi PG. Role of nutritional status in predicting quality of life outcomes in cancer—a systematic review of the epidemiological literature. *Nutrition Journal*. 2012; 11(1): 11-27. doi: [10.1186/1475-2891-11-27](https://doi.org/10.1186/1475-2891-11-27)

35. Nourissat A, Vasson MP, Merrouche Y, et al. Relationship between nutritional status and quality of life in patients with cancer. *Eur J Cancer*. 2008; 44: 1238-1242. doi: [10.1016/j.ejca.2008.04.006](https://doi.org/10.1016/j.ejca.2008.04.006)

36. Thoresen L, Frykholm G, Lydersen S, et al. The association of nutritional assessment criteria with health related quality of life in patients with advanced colorectal carcinoma. *European Journal of Cancer Care*. 2012; 21(4): 505-516. doi: [10.1111/j.1365-2354.2012.01327.x](https://doi.org/10.1111/j.1365-2354.2012.01327.x)

37. Wallengren O, Lundholm K, Bosaeus I. Diagnostic criteria of cancer cachexia: relation to quality of life, exercise capacity and survival in unselected palliative care patients. *Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer*. 2013; 21(6): 1569-1577. doi: [10.1007/s00520-012-1697-z](https://doi.org/10.1007/s00520-012-1697-z)

38. Al-Majid S, McCarhy DO. Cancer-induced fatigue and skeletal muscle wasting: the role of exercise. *Biological Research for Nursing*. 2001; 2: 186-197. doi: [10.1177/109980040100200304](https://doi.org/10.1177/109980040100200304)

39. Radbruch L, Elsner F, Trottenberg P, Strasser F, Fearon K. Clinical practice guidelines on cancer cachexia in advanced cancer patients. Aachen, Department of Palliative Medicinen/ European Palliative Care Research Collaborative. 2010.

40. Ardies CM. Exercise, cachexia, and cancer therapy: a molecular rationale. *Nutrition and Cancer*. 2002; 42: 143-157.

41. World Health Organization. Global physical activity surveillance. Available at: <http://www.who.int/chp/steps/GPAQ/en/> 2004; Accessed February 1, 2016.

42. Yates JW, Chalmer B, McKegney FP. Evaluation of patients with advanced cancer using the Karnofsky performance status. *Cancer*. 1980; 45: e2220-e2224. doi: [10.1002/1097-0142\(19800415\)45:8<2220::AID-CNCR2820450835>3.0.CO;2-Q](https://doi.org/10.1002/1097-0142(19800415)45:8<2220::AID-CNCR2820450835>3.0.CO;2-Q)

43. Gagnon B, Murphy J, Eades M, et al. A prospective evaluation of an interdisciplinary nutrition-rehabilitation program for patients with advanced cancer. *Current oncology*. 2013; 20(6): 310-318. doi: [10.3747/co.20.1612](https://doi.org/10.3747/co.20.1612)

44. Ferriolli E, Skipworth RJ, Hendry P, et al. Physical activity monitoring: a responsive and meaningful patient-centered outcome for surgery, chemotherapy, or radiotherapy?. *Journal of Pain and Symptom Management*. 2012; 43(6): 1025-1035. doi: [10.1016/j.jpainsymman.2011.06.013](https://doi.org/10.1016/j.jpainsymman.2011.06.013)

45. Lundholm K, Daneryd P, Bosaeus I, Korner U, Lindholm E. Palliative nutritional intervention in addition to cyclooxygenase and erythropoietin treatment for patients with malignant disease: effects on survival, metabolism and function. *Cancer*. 2004; 100: 1967-1977. doi: [10.1002/cncr.20160](https://doi.org/10.1002/cncr.20160)

46. Bauer J, Capra S. Intensive nutrition intervention improves outcomes in patients with cancer cachexia receiving chemotherapy – a pilot study. *Support Care Cancer*. 2005; 13: 270-274.
47. Davidson W, Ash S, Capra S, Bauer J. Weight stabilization is associated with improved survival duration and quality of life in unresectable pancreatic cancer. *Clinical Nutrition*. 2004; 23: 239-247.
48. Fearon K. Cancer cachexia: developing multimodal therapy for a multidimensional problem. *European Journal of Cancer*. 2008; 44(8): 1124-1132. doi: [10.1016/j.ejca.2008.02.033](https://doi.org/10.1016/j.ejca.2008.02.033)
49. Lee JL, Leong LP, Lim SL. Nutrition intervention approaches to reduce malnutrition in oncology patients: a systematic review. *Supportive Care in Cancer*. 2016; 24(1): 469-480. doi: [10.1007/s00520-015-2958-4](https://doi.org/10.1007/s00520-015-2958-4)
50. Read J, Beale P, Volker D, Smith N, Childs A, Clarke S. Nutrition intervention using an eicosapentaenoic acid (EPA)-containing supplement in patients with advanced colorectal cancer. Effects on nutritional and inflammatory status: a phase II trial. *Support Care Cancer*. 2007; 15: 301-307. doi: [10.1007/s00520-006-0153-3](https://doi.org/10.1007/s00520-006-0153-3)
51. Isenring E, Capra S, Bauer J. Nutrition intervention is beneficial in oncology outpatients receiving radiotherapy to the gastrointestinal, head or neck area. *British Journal of Cancer*. 2004; 91: 447-452.
52. Kapoor N, Naufahu J, Tewfik S, Bhatnagar S, Garg R, Tewfik I. A public health nutrition intervention to delay the progression of cachexia to refractory cachexia in indian female cancer patients: a conceptual framework. *Int J Food, Nutr Public Heal*. 2014; 7(1): 1-11.
53. Baldwin C, Spiro A, Ahern R, Emery PW. Oral nutritional interventions in malnourished patients with cancer: a systematic review and meta-analysis. *J Natl Cancer Inst*. 2012; 104(5): 371-385. doi: [10.1093/jnci/djr556](https://doi.org/10.1093/jnci/djr556)
54. Caccialanza R, Pedrazzoli P, Cereda E, et al. Nutritional support in cancer patients: a position paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE). *Journal of Cancer*. 2016; 7(2):131-135. doi: [10.7150/jca.13818](https://doi.org/10.7150/jca.13818)