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Role of Comorbidity and Functional Status in Treatment Selection and Outcomes in Older Cancer Patients

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ABSTRACT

As the global population ages, the incidence of cancer among older adults is rising, making the management of cancer in this demographic a critical area of study. The main objective of the study is to find the role of comorbidity and functional status in treatment selection and outcomes in older cancer patients. This retrospective cohort study was conducted at Amrita Institute of Medical Science and Research Centre Kochi. Data were collected from 265 patients. Data were extracted from electronic medical records and included demographic information (age, sex), cancer type and stage, treatment modalities, comorbid conditions, functional status and treatment outcomes. The data included demographic details such as age and sex, as well as clinical information encompassing cancer type and stage, treatment modalities, comorbid conditions, functional status, and treatment outcomes. The study included 265 older cancer patients. Mean age of patients was 59.98±3.56 years, comprising 145 males (54.7%) and 120 females (45.3%). The most common cancer types were colorectal (25%), breast (20%), lung (18%), prostate (15%) and hematologic malignancies (12%), with the remaining 10% being other types. A significant majority of patients (77.4%) were diagnosed with advanced-stage (III-IV) cancer, while 22.6% had early-stage (I-II) disease. The median overall survival (OS) for the study cohort was 24 months. Patients with a Charlson Comorbidity Index (CCI) score of less than 3 had a median OS of 36 months, while those with a CCI score of 5 or higher had a median OS of 18 months. It is concluded that comorbidity and functional status play pivotal roles in determining treatment selection and outcomes in older cancer patients. Comprehensive assessments and personalized care strategies are essential for optimizing treatment efficacy and improving the quality of life in this demographic.

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Key Words

Population, demographic, functional, retrospective

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INTRODUCTION

As the global population ages, the incidence of cancer among older adults is rising, specifically, the management of cancer in older patients is considered to be challenging because most elderly patients usually present with comorbid diseases and diverse degrees of functional disability that directly affect decisions on the choice of therapy as well as the outcomes[1]. Conditions known as comorbidities are other illnesses that may be present in a patient along with a specific disease, and they are known to affect cancer therapies and treatment outcomes since they contribute to adverse effects[2]. Another dimension complementary to organizational-functional impairment of patients with malignant neoplasms is functional status, which characterizes the patient's ability to perform activities of daily living, as, in fact, it determines the patient's ability to tolerate oncological treatment[3]. This sets the context for a discussion on how comorbidities and functional status are central concepts for deciding on cancer treatment in older patients because they directly not only affect the treatment options and prognosis but warrant a person-centred approach to cancer treatment in older adults[4]. It is worthy of note that patients aged sixty-five and above have other complicating diseases and therefore the type of treatment given as well as the extent of treatment is put into consideration. Chronic diseases like; cardiovascular diseases, diabetes and chronic respiratory diseases are prime examples of diseases whose treatment plans may be restricted due to interjection of certain drugs or enhanced risk of treatment side effects[5]. This balance can influence the quality of cancer therapy, thus stressing the necessity of multi-faceted evaluations of older cancer patients [6]. This, together with the type of cancer and its stage, helps in the determination of the functional status of the older cancer patients and this determines the treatment to be offered[7]. The patients' functional status is usually evaluated with questionnaires or the scales like the Katz-15ADL scale or the ECOG-PS. It becomes clear that comorbidity when interacting with the patient's functional status can be quite diverse and require the involvement of various specialized disciplines in its management[8]. Existence of coexisting diseases influences functional deterioration and thus complicates the therapeutic management. For instance, a client who is a COPD and cancer candidate will likely suffer from a sharp deterioration of their physical wellbeing, affecting the likelihood of tolerating some forms of treatment [9]. On the other hand, reduction of functional status results in the deterioration of other diseases as patients are confined to bed and are unable to move around as they used to hence generating formation of a vicious cycle. This interdependence supports the call for integrating both medical and functional approaches to the management of the patient's conditions. A proper evaluation of the presence of additional diseases and the general state of older patients plays a critical role in cancer management[10].

Objectives: The main objective of the study is to find the role of comorbidity and functional status in treatment selection and outcomes in older cancer patients.

MATERIALS AND METHODOLOGY

This retrospective cohort study was conducted at Amrita Institute of Medical Science and Research Centre Kochi. Data were collected from 265 patients.

Inclusion Criteria:

- Age>60 and above years and diagnosed with any type of solid or hematologic malignancy.
- Received at least one form of cancer treatment

Exclusion Criteria:

- Patients with incomplete medical records.
- Patients with a life expectancy of less than three months at the time of diagnosis due to non-cancer-related conditions.

Data Collection: Data were extracted from electronic medical records and included demographic information (age, sex), cancer type and stage, treatment modalities, comorbid conditions, functional status, and treatment outcomes. The data included demographic details such as age and sex, as well as clinical information encompassing cancer type and stage, treatment modalities, comorbid conditions, functional status, and treatment outcomes. Comorbidity was assessed using the Charlson Comorbidity Index (CCI), which quantifies the burden of coexisting medical conditions. Functional status was evaluated using the Eastern Cooperative Oncology Group (ECOG) Performance Status and the Katz Index of Independence in Activities of Daily Living (ADL). These assessments provided comprehensive insights into the patients' overall health and ability to perform daily activities. Treatment outcomes were measured in terms of overall survival (OS), progression-free survival (PFS), treatment-related toxicities and quality of life (QoL), the latter being assessed through the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30). This comprehensive data set enabled a thorough analysis of how comorbidity and functional status influence treatment decisions and outcomes in older cancer patients.

Statistical Analysis: Descriptive statistics were used to summarize patient characteristics, comorbidities, functional status and treatment modalities. Continuous

variables were expressed as means±standard deviations and categorical variables were presented as frequencies and percentages.

RESULTS AND DISCUSSIONS

The study included 265 older cancer patients. Mean age of patients was 59.98±3.56 years, comprising 145 males (54.7%) and 120 females (45.3%). The most common cancer types were colorectal (25%), breast 20%), lung (18%), prostate (15%) and hematologic malignancies (12%), with the remaining 10% being other types. A significant majority of patients (77.4%) were diagnosed with advanced-stage (III-IV) cancer, while 22.6% had early-stage (I-II) disease. The average Charlson Comorbidity Index (CCI) score was 4.2, indicating a substantial burden of comorbid conditions. The mean ECOG Performance Status was 2.1, and the mean Katz ADL score was 4.8, reflecting varying levels of functional status among the patients.

Table 1: Baseline Characteristics of the Study Population (N = 265)

Characteristic	Value
Age (years)	59.98±3.56 years
Sex, n (%)	
-Male	145 (54.7%)
-Female	120 (45.3%)
Cancer Type, n (%)	
-Colorectal	66 (25%)
-Breast	53 (20%)
-Lung	48 (18%)
-Prostate	40 (15%)
-Hematologic	32 (12%)
-Other	26 (10%)
Cancer Stage, n (%)	
-Early (I-II)	60 (22.6%)
-Advanced (III-IV)	205 (77.4%)
Charlson Comorbidity Index, mean (range)	4.2 (1-8)
ECOG Performance Status, mean (range)	2.1 (0-4)
Katz ADL Score, mean (range)	4.8 (0-6)

Table 2: Treatment Selection by Comorbidity (Charlson Comorbidity Index)

CCI Score	Curative Intent	Palliative Intent
<3	70% (n=74)	30% (n=31)
≥5	25% (n=32)	75% (n=96)
Mean CCI Score	3.1	5.2

Table 3: Treatment Selection by Functional Status (ECOG Performance Status and Katz ADL Score)

Functional Status	Curative Intent	Palliative Intent
ECOG 0-1	65% (n=69)	35% (n=37)
ECOG 3-4	20% (n=21)	80% (n=95)
Mean ECOG Score	1.5	2.7
Mean Katz ADL Score	5.5	3.8

Table 4: Survival Outcomes

Survival Outcome	Median (months)
Overall Survival (OS)	24
-CCI<3	36
-CCI≥5	18
-ECOG 0-1	40
-ECOG 3-4	15
Progression-Free Survival (PFS)	16
-CCI< 3	25
-CCI≥5	10
-ECOG 0-1	30
-ECOG 3-4	8

Table 5: Multivariable Analysis for Overall Survival (OS) and Progression-Free Survival (PFS)

Variable	Hazard Ratio (HR)	95% Confidence Interval (CI)	p-value
Overall Survival (OS)			
-Higher CCI score	1.5	1.2-1.8	<0.01
-Higher ECOG score	1.7	1.3-2.1	<0.01
-Advanced cancer stage	2.0	1.5-2.6	<0.01
Progression-Free Survival (PFS)			
-Higher CCI score	1.4	1.1-1.7	<0.01
-Higher ECOG score	1.6	1.2-2.0	<0.01
-Advanced cancer stage	1.8	1.4-2.3	<0.01

Patients with a lower Charlson Comorbidity Index (CCI) score (<3) were more likely to receive curative intent treatments, with 70% (n=74) opting for these aggressive therapies, compared to 30% (n=31) who received palliative care. Conversely, patients with a higher CCI score (= 5) predominantly received palliative intent treatments, with 75% (n=96) in this category, while only 25% (n=32) underwent curative treatments. Patients with better functional status, indicated by an ECOG Performance Status of 0-1, were more likely to receive curative intent treatments, with 65% (n=69) in this group opting for such therapies, compared to 35% (n=37) who received palliative care. Conversely, those with poorer functional status (ECOG 3-4) predominantly received palliative intent treatments, with 80% (n=95) in this category, while only 20% (n=21) underwent curative treatments. The mean ECOG score for patients receiving curative treatments was 1.5, whereas it was 2.7 for those receiving palliative treatments.

The median overall survival (OS) for the study cohort was 24 months. Patients with a Charlson Comorbidity Index (CCI) score of less than 3 had a median OS of 36 months, while those with a CCI score of 5 or higher had a median OS of 18 months. Similarly, patients with an ECOG Performance Status of 0-1 had a median OS of 40 months, compared to 15 months for those with an ECOG score of 3-4. The median progression-free survival (PFS) for the cohort was 16 months. Patients with a CCI score of less than 3 had a median PFS of 25 months, while those with a CCI score of 5 or higher had a median PFS of 10 months. For OS, a higher Charlson Comorbidity Index (CCI) score was associated with a hazard ratio (HR) of 1.5 (95% CI: 1.2-1.8, $p < 0.01$), a higher ECOG Performance Status score had an HR of 1.7 (95% CI: 1.3-2.1, $p < 0.01$), and advanced cancer stage had an HR of 2.0 (95% CI: 1.5-2.6, $p<0.01$). For PFS, a higher CCI score was associated with an HR of 1.4 (95% CI: 1.1-1.7, $p<0.01$), a higher ECOG score had an HR of 1.6 (95% CI: 1.2-2.0, $p<0.01$), and advanced cancer stage had an HR of 1.8 (95% CI: 1.4-2.3, $p<0.01$). The findings from this study underscore the substantial impact of comorbidity and functional status on treatment selection and outcomes in older cancer patients. This can be supported by previous studies suggesting that presence of one or more diseases affects cancer therapy through aggravating positive outcomes, adverse effects and the efficiency of therapies[11]. Also, the interaction between the comorbidity indices and the treatment groups revealed that the higher comorbidity was related to significantly

worse OS and PFS. Patients with CCI of 5 or more had significantly shorter OS and PFS than those with CCI of <3 and these results underscore the significance of comorbid condition assessment as it depicts overall health status of a patient where aggressiveness of cancer therapy is a critical factor considering presence/absence of comorbid conditions and their impact on the patient's health[12]. Importance of functional status in decision making and treatment outcome is also illustrated Patients whose ECOG score was 0-1 had more optimum treatments with curative intent compared to patients with ECOG score of 3-4 did hence this group of patients showed improved median OS and PFS[13]. This difference means that the Katz ADL Score is significantly different in patients in the curative and palliative treatment groups, which implies that functional independence can influence different treatment programs. This concurs with the literature, particularly where functional status has been identified as a modifiable determinant of a patient's prognosisand his/her capacity to undergo and benefit from cancer treatments [14]. These outcomes confirm that an initial and/or repeat FIM assessment for elderly cancer patients can help direct the therapeutic management and recommend outcome expectations. Since it was hypothesized that patients with greater CCI scores and poorer functional status would have worse treatment-related toxicities, the study received expected results[15]. Due to this correlation, it is important to adopt individual patient care where both the disease management aspect and functions of patients are taken into consideration[16]. Optimizing cancer therapies at older patients depending on the specific needs and abilities of the patients can reduce the occurrence of severe toxicities and enhance the acceptable levels of therapies. In regards to the QoL as assessed by EORTC QLQ-C30, patients with lower comorbidity index and better functional status seemed to have a better health related QoL[17]. In summary, these studies imply that intervention aimed at enhancing actual physical and mental capacities or preserving the basal level of functional capability by patients with cancer over 65, as well as proper control of comorbid conditions, can result in better QoL. Clinicians should apply both rehabilitation activities as well as other targeted measures that aim at the control or improvement of possible comorbid conditions in order to improve patients' functioning.

Clinical Implications: The results of this study have several important implications for clinical practice:

- **Comprehensive Assessments:** Implementing comprehensive geriatric assessments (CGAs) that include evaluations of comorbidity and functional status can provide a more holistic understanding of an older cancer patient's health, guiding more effective and personalized treatment plans.
- **Multidisciplinary Care:** The complexity of treating older cancer patients underscores the need for multidisciplinary care teams. By involving oncologists, geriatricians, nurses, social workers, and other healthcare professionals, treatment plans can address the diverse needs of patients, from managing comorbid conditions to providing functional support and palliative care.
- **Personalized Treatment Plans:** The significant variability in treatment tolerance and outcomes based on comorbidity and functional status highlights the need for personalized treatment approaches. Clinicians should consider these factors when designing cancer treatment regimens to optimize outcomes and minimize adverse effects.
- **Patient-Centered Care:** Emphasizing patient-centered care, which includes involving patients in decision-making processes and considering their preferences and goals, is crucial. Understanding patients' perspectives on treatment options and their potential impact on quality of life can lead to more satisfactory and effective care.

CONCLUSION

It is concluded that comorbidity and functional status play pivotal roles in determining treatment selection and outcomes in older cancer patients. Comprehensive assessments and personalized care strategies are essential for optimizing treatment efficacy and improving the quality of life in this demographic.

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