

Original Article

Profile of Specific Cancer Types in Patients Undergoing Curative Radiotherapy: Findings from a One-Year Descriptive Study

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Abstract

Background: The incidence and mortality rates of cancer have risen rapidly worldwide, driven by an aging population, urbanization, sedentary lifestyles, economic development, and increased tobacco and alcohol consumption.

Objective: This study aimed to evaluate the one-year occurrence of cancer and the sociodemographic and clinical features of patients receiving curative radiotherapy at Tikur Anbessa Specialized Hospital.

Methodology: We conducted a cross-sectional descriptive study on cancer patients receiving curative radiotherapy at Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia, from April 2021 to March 2022. A standardized questionnaire was used to collect sociodemographic and clinical data. Descriptive statistics were analyzed using SPSS version 24, with a significance level set at 0.05.

Results: A total of 64 patients (44 females and 20 males) were analyzed. The majority (42.2%) were aged 45 to 64 years, and 70% resided in urban areas, where a higher incidence of gynecologic cancer was noted. Most patients (78%) had locally advanced cancer, and 84.4% (54) were unaware of their cancer diagnosis. Head and neck cancer was the most prevalent, accounting for 31.3% (20 cases), while cervical cancer was the leading type among women, with 17 cases (38.6%), of which 15.9% (7) were HIV positive.

Conclusion: The findings indicate that head and neck cancer is the most prevalent type of cancer, with cervical cancer as the leading cause among women. Most patients presented at a locally advanced stage, and many lacked awareness of cancer. Awareness-raising initiatives are crucial to enhance public knowledge about cancer, facilitating early detection and treatment.

Key words: Cancer, Curative Radiotherapy, Tikur Anbessa Specialized Hospital

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Introduction

In 2019, the reported global mortality data indicated 20.4 million premature deaths, with more than three-quarters of these deaths attributed to non-communicable diseases. Cancer, being a major non-communicable disease, was the leading cause of death and a significant contributor to reduced life expectancy worldwide. According to GLOBOCAN 2022, there were approximately 20 million new cases of cancer and 9.7 million deaths worldwide (1). Among the newly diagnosed cases, female breast cancer was the most prevalent, with an estimated 2.3 million cases. In comparison, lung cancer was the

leading cause of cancer-related deaths with an estimated 1.8 million cases. By 2040, the global burden of cancer is expected to rise to 28.4 million, representing a 47% increase from 2020. The transitioning countries are expected to experience a smaller increase (32%-56%) in cancer prevalence compared to transitioning countries (2).

In general, the incidence and mortality rates of cancer have been increasing globally due to multiple factors, including population growth, aging, and alterations in the prevalence of various cancer

risk factors such as urbanization, physical inactivity, economic development, smoking, and alcohol consumption (3,4)

With a population of over 120 million, Ethiopia is classified as a low-income country in sub-Saharan Africa. As the global health landscape shifts toward non-communicable diseases, the national cancer mortality rate in Ethiopia is approximately 5.8%. It is estimated that the annual incidence rate is around 60,960, with a mortality rate exceeding 44,000. For individuals under age 75, the risk of being diagnosed with cancer is 11.3%, with a corresponding mortality risk of 9.4% (5,6).

According to the recent GLOBOCAN 2020 report, there were 80,334 new cases of cancer and 54,698 deaths due to cancer in Ethiopia. Breast cancer (21.0%) was found to be the most frequent type, followed by cervix uteri (10.2%), colorectum (8.2%), and leukemia (5.9%). Among the leading causes of death, breast cancer accounted for 17.6%, followed by cervix uteri (10.9%), colorectum (8.9%), and leukemia (6.4%) (7). The treatment of cancer primarily relies on surgery, radiotherapy (RT), chemotherapy, or a combination of these approaches. Furthermore, other methods exist, including immunotherapy, targeted therapy, and gene therapy. RT, which involves the use of ionizing radiation, has been utilized in cancer treatment since the discovery of radium. Following its discovery, radiation medicine interventions have continued to play a significant role in cancer care, including prevention, diagnosis, treatment, and other aspects. RT, in particular, is essential in both curative and palliative cancer treatment (8). Curative treatment aims to destroy cancer cells or inhibit their growth and reproduction. On the contrary, palliative treatment focuses on alleviating pain associated with specific conditions. Typically, palliative radiation therapy involves fewer sessions compared to curative treatment (9).

In Ethiopia, there is only one RT center, located at Addis Ababa Tikur Anbessa Specialized Hospital, which functions as the sole referral hospital for oncology cases nationwide. Recently, a new RT center was opened in February 2022 at Jimma University Specialized Hospital. Currently, the Tikur Anbessa RT center treats more than 2000 patients each month, including both curative and palliative RT. Notably, the number of patients receiving palliative RT exceeds those undergoing curative or radical RT. The main goal of this study was to report the prevalence of cancers in patients who received curative RT and to explain why there are fewer patients receiving curative intent RT compared to palliative RT.

Materials and Methods

Study design and area

A cross-sectional descriptive study was conducted to establish a one-year profile of various cancers in pa-

tients receiving curative radiotherapy (RT) at the Radiotherapy Center of Tikur Anbessa Specialized Hospital, Addis Ababa University, Ethiopia. Tikur Anbessa Specialized Hospital is the largest referral hospital in the country, providing services in various medical specialties. Among these is the radiotherapy center, which was inaugurated in October 1997. The center includes an outpatient department (OPD), an inpatient facility with 18 beds, day care chemotherapy, radiotherapy, and brachytherapy facilities. There are two teletherapy machines: one Linear Accelerator (LINAC) and one Cobalt-60 (Co-60); however, the Cobalt-60 was not functioning during this study. The LINAC machine was installed in 2019 and began its first treatment on November 17, 2020, and it is still functioning well during this study. A Computed Tomography (CT) scan simulation facility is also available at the center. The LINAC machine serves about 40-50 patients during regular working hours and 50-55 patients during part-time (night). Hence, approximately 90-100 patients receive both palliative and curative/radical radiation treatment within 24 hours. On weekends, about 40 patients receive radiotherapy. Currently, the radiotherapy center has 7 senior clinical oncologists, 4 medical physicists, 8 radiation therapy technologists, 22 oncology nurses, and 36 clinical oncology residents.

Study population and period

The source population consisted of all cancer patients referred to Tikur Anbessa Specialized Hospital's Radiotherapy center, while the study population comprised all cancer patients who met the eligibility criteria. All patients who fulfilled the eligibility criteria and were available during the study period were included, and their medical records were accessed for the study. Their sociodemographic characteristics and cancer profiles were described under the results. The study was conducted from April 2021 to March 2022. Their sociodemographic characteristics and cancer profile were described.

Eligibility criteria

Patients eligible for curative radiotherapy, aged 18 and older, who provided informed consent and were available during the study period, were included in the study. Those receiving palliative radiotherapy were excluded. The reason we excluded pediatric patients from our study is that we focused on patients who presented during our study period (April 2021 - March 2022) and did not include those (pediatric or adult) who had already started RT before data collection began. During this period, there were only three pediatric patients whose families did not agree to provide informed consent. Their families were focused solely on clinical purposes and were not interested in giving consent for research purposes.

Data collection

The study utilized a standardized questionnaire in both Amharic and English, developed with expert input in the field. The clarity, understandability, and flow of each question were assessed, ensuring that the interview could be completed in approximately 15 minutes. Data were collected by trained health professionals through face-to-face interviews and by reviewing medical records for additional clinical characteristics. Patient demographics and clinical information were captured. Each individual was assigned a unique code written on the questionnaires to maintain confidentiality. The collected data were securely stored in locked facilities to ensure confidentiality, and the principal investigator checked the data daily for completeness.

Data analysis

Sociodemographic and clinical characteristics were recorded and monitored daily for completeness. After entering the data into an Excel sheet, graphs and tables were created. To describe these characteristics, SPSS version 24 was used, and the results were presented as frequencies, percentages, and mean ($\pm$ SD) for age.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of Addis Ababa University, College of Health Sciences, with protocol number 009/20/IM.

Results

Sociodemographic characteristics of the study participants

Between April 2021 and March 2022, a total of 714 new patients underwent radiotherapy treatment, with 471 receiving palliative therapy and 243 receiving curative therapy. Notably, the number of curative RT treated patients was about half of the number of palliative RT treated patients. During our study, we observed that only one teletherapy machine was available for treating patients. As a result, emergency/ palliative patients were given priority over curative patients, who had to wait longer for treatment. This is the main reason why the number of curative intent radiation therapy treatments was significantly lower than the number of palliative radiation therapy treatments.

From the 243 curative RT treated patients, 64 of them met the inclusion criteria and provided informed consent to participate in the study.

In this study, there were 44 (68.7%) females and 20 (31.3%) males with a female-to-male ratio (F: M) of 2.2: 1. The mean age of the study group was 42.8 ($\pm$ 13.47) years, with a range of 19 to 79 years. In terms of residency, 70.3% of them were urban dwellers, and the others, 29.7% were from rural settings. The most significant proportion of patients in the study (37.5%) were from Addis Ababa, followed by Oromia (32.8%), Amhara (12.5%), SNNP (9.4%), and other regions (7.8%). The

majority of study participants (more than 80%) were married, with almost half of them (59.3%) being unemployed and 32.8% employed in either government or private institutions. About 34.4% of patients had a diploma or higher education, while 20.2% were in the range of grade 7-12. Unfortunately, almost all of the study participants (84.4%) had no awareness of cancer disease (Table 1).

Discussion

This study involved 64 patients who received curative radiotherapy, comprising 44 females and 20 males. The female-to-male ratio (F: M) was 2.2:1. Most of the patients resided in urban areas, with a significant proportion living in Addis Ababa (37.5%) and Oromia (32.8%). Similar studies carried out in China, Nepal, and the USA have also indicated a higher prevalence of cancer in urban populations compared to rural populations (10–13). The mean age of the study participants was 42.8 ($\pm$ 13.47) years, with an age range of 19 to 79 years. A study conducted in North Western Nigeria yielded a similar mean age of 45.5 years (14). Cervical cancer is the second most common form of cancer in Ethiopia (15), and our study also observed a heightened number of cervical cancer cases.

More than three-quarters of the study participants did not have awareness about cancer, which is a major problem that has been observed in many other studies (16). Low-level awareness about cancer or its warning signs is a significant barrier to timely diagnosis and treatment, often leading to an advanced stage of the disease.

For instance, a study done in Jordan revealed that 27% of cancer patients in the country are diagnosed at an advanced stage (17). Similarly, research done in Australia and Denmark reported a low level of awareness and knowledge for all types of cancer (17–18). In Asia, studies conducted in Iran, Malaysia, and Saudi Arabia also revealed similar findings (20–22). A study done in the United Kingdom also showed that cancer awareness is low across all ethnic groups in the UK (23).

Our study revealed a 34.4% unemployment rate, affecting approximately half of the study participants. Furthermore, approximately one-third of the participants held a diploma or higher education level. Among our study participants, we found 8 (12.5%) HIV positive cases, where all of them were females (seven cervical and one breast cancer) patients. Higher prevalence of HIV was demonstrated in cancer patients around the globe. For instance, a study conducted three years ago in our hospital, Tikur Anbessa Specialized Hospital, radiotherapy center, showed that the prevalence of HIV among cervical cancer patients was 18.4% (24).

Table 1: Sociodemographic and clinical characteristics of cancer patients treated at the radiotherapy center of Tikur Anbessa Specialized Hospital between April 2021 and March 2022, Addis Ababa, Ethiopia (N=64)

Sociodemographic characteristics	
Variable	No (%)
Gender	
Female	44 (68.7)
Male	20(31.3)
Residency	
Urban	45(70.3)
Rural	19(29.7)
Region	
Addis Ababa	24(37.5)
Oromia	21(32.8)
Amhara	8(12.5)
SNNP	6(9.4)
Others	5(7.8)
Religion	
Orthodox	37(75.8)
Protestant	17(26.6)
Muslim	5(7.8)
Unknown	5(7.8)
Marital status	
Married	52(81.3)
Single	8(12.5)
Widowed	4(6.3)
Education	
Diploma & above	22(34.4)
7 – 12	20(31.3)
No formal education	13(20.3)
1 - 6	9(14.1)
Occupation	
Not employed	38(59.3)
Employed	21(32.8)
Student	5(7.8)
Cancer awareness	
No	54(84.4)
Yes	10(15.6)
Cigarette smoking	
Yes	2(3.1)
No	62(96.9)
Clinical characteristics	
TNM Stages	
Early (I-IIA)	9 (14.1)
Locally advanced (IIB – IIIC)	50(78)
Advanced (IVA & IVB)	5(7.8)
Serostatus (HIV)	
Positive	8(12.5)
Negative	56(87.5)

The age distribution of the patients showed that 42.2% were between the ages of 45 and 64, 40.6%

were between 25 and 44, 11% were below 24 years of age, and 6.3% were 65 years old or above. (see Fig. 1).

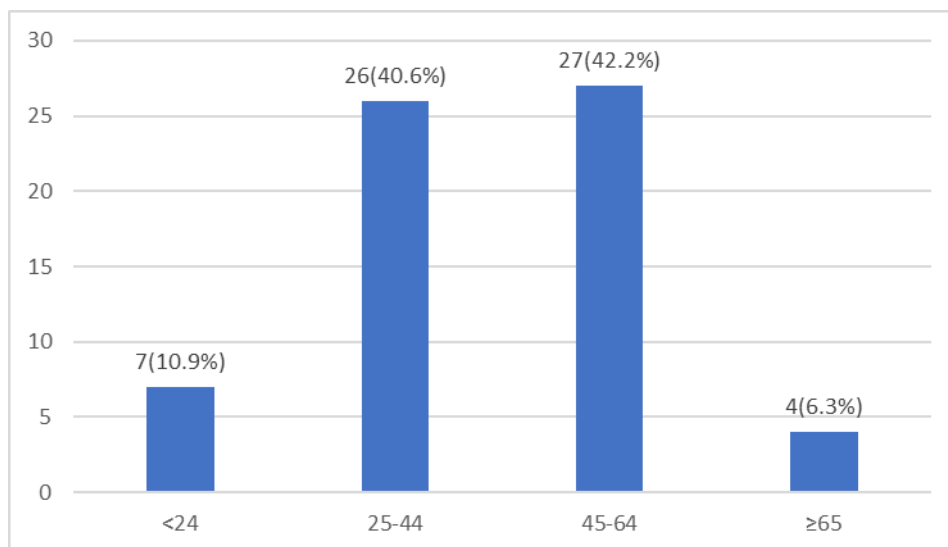


Figure 1: The occurrence of cancer in different age groups of patients who underwent curative RT at the radiotherapy center of Tikur Anbessa Specialized Hospital between April 2021 and March 2022, Addis Ababa, Ethiopia (N=64)

3.2. Clinical characteristics of the study participants

12.5% of the study participants were HIV positive, and all were females. In terms of cancer staging, 78% of patients had locally advanced (stages IIB–IIIC) cancer, while 14.1% had early-stage (I–IIA) cancer and 7.8% had advanced-stage (IVA & IVB) cancers (fig 2).

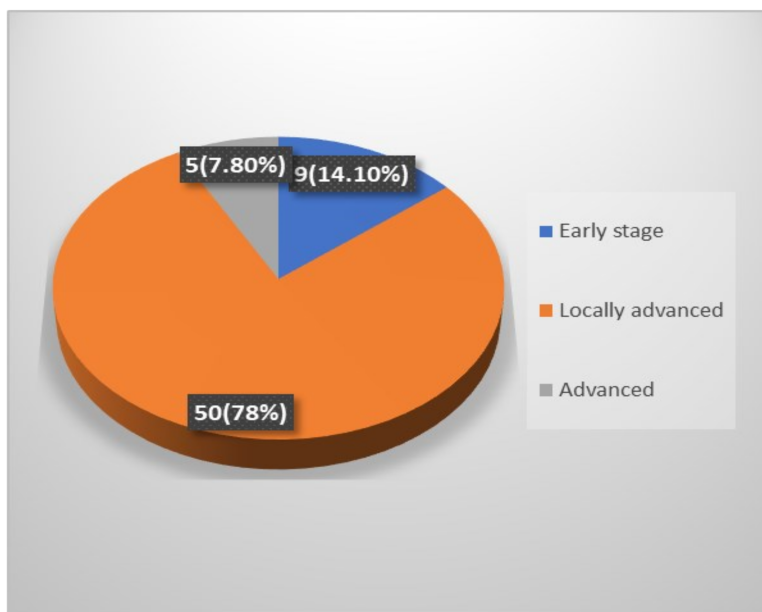


Figure 2: Clinical group staging of patients who took curative RT at the radiotherapy center of Tikur Anbessa Specialized Hospital between April 2021 and March 2022, Addis Ababa, Ethiopia (N=64)

In this study, most of the patients, 20 (31.3%), had head and neck cancer, followed by cervical cancer, 17 (26.5%) rectal cancer, 10 (14.1%), and sarcomas, 7 (10.9%). The incidents of breast, prostate, HL/NHL, and glioblastoma cancers are indicated in figure 3.

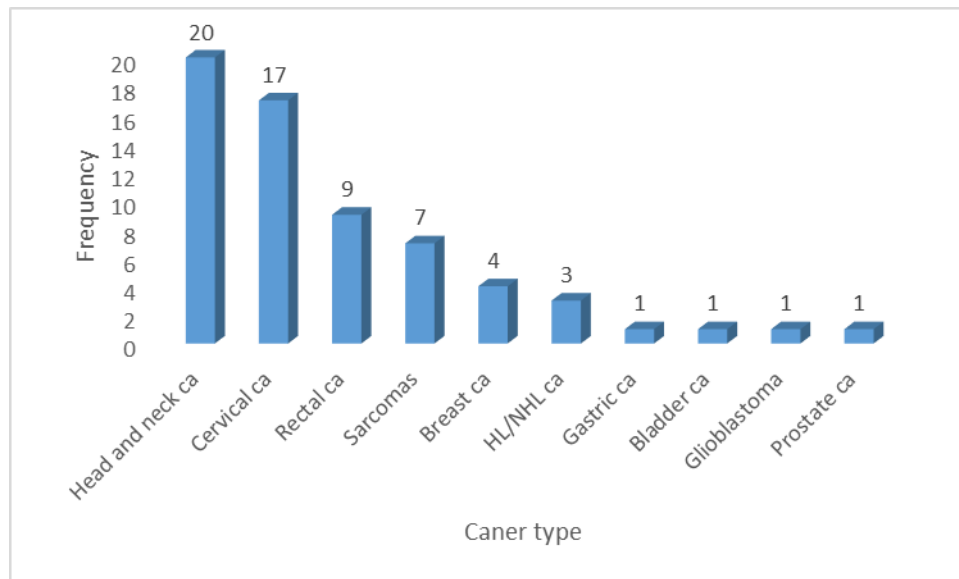


Figure 3: Type of cancer among patients who underwent curative RT at radiotherapy center of Tikur Anbessa Specialized Hospital between April 2021 and March 2022, Addis Ababa, Ethiopia (N=64) (N=64).

Based on patients' residence, all nine rectal cancer patients (100%), 15 out of 17 cervical cancer patients (88.2%), and all four breast cancer patients (100%) resided in urban areas (see Table 2).

Table 2: Description of Cancer type about residence area in curative RT treated patients at radiotherapy center of Tikur Anbessa Specialized Hospital between April 2021 and March 2022, Addis Ababa, Ethiopia (N=64) (N = 64)

Cancer type	Residence area		Total
	Urban	Rural	
Head & neck	10(50.0%)	10(50.0%)	20(100%)
Cervical	15(88.2%)	2(11.7%)	17(100%)
Rectal/colorectal	9(100%)	0(0.0%)	9(100%)
Sarcoma	4(57.1%)	3(42.8%)	7(100%)
Breast	4(100%)	0(0.0%)	4(100%)
HL/NHL	1(33.3%)	2(66.7%)	3(100%)
Glioblastoma	0(0.0%)	1(100%)	1(100%)
Bladder	1(100%)	0(0.0%)	1(100%)
Gastric	1(100%)	0(0.0%)	1(100%)
Prostate	0(0.0%)	1(100%)	1(100%)
Total	45(70.3)	19(29.7)	64(100%)

The slight difference with our finding could be due to a difference in sample size. A similar study conducted in the same hospital reported 13.3% HIV positive cancer patients, which is similar to our current finding (25). A report from the Guinea Donka University Hospital shows 2.1% of HIV cases. The prevalence of HIV in this study is smaller than that of ours. This may be due to differences in sample size, socioeconomic status, and other cultural and geographical differences (26)

Based on cancer type, our study revealed 31.3% head and neck, 26.5% cervical, 14.1% rectal, and about 11.0% sarcomas. A survey conducted in the UK and globally reviews the epidemiology of head and neck cancer (HNC), highlighting an increasing prevalence, particularly of oropharyngeal cancer. The research indicates that HNC accounts for over 660,000 new cases and 325,000 deaths (27). The possible justification for the difference with our study may be due to the difference in sample size.

In terms of cancer stages, our study found that 78% of the participants had locally advanced cancers, with 77.3% of females and 80% of males affected. 14.1% and 7.8% of the study participants had early and advanced stages of the disease, respectively.

Our findings are consistent with a study conducted in Chennai, India, which reported that 70% of breast cancer patients had locally advanced cancer (28).

Our study revealed that rectal, cervical, and breast cancers were prevalent among urban residents, with 100%, 88.2%, and 100% respectively.

Conclusions and Recommendations

This study revealed that most of the patients treated with curative RT presented at the locally advanced stage of the disease. The number of curative intent patients was about half of the number of palliative patients. Almost all of our study participants were not aware of cancer. The majority of the patients were females and relatively young during the treatment. We have observed that urban women are more prone to gynecologic malignancies than rural women are.

Therefore, we recommend that awareness raising about cancer to the public is mandatory as it helps people to report cancer symptoms at an early stage.

Additionally, understanding differences in cancer occurrence between urban and rural residents helps in devel-

oping targeted cancer prevention and control strategies. We also recommend conducting further research with a large set of patients.

Furthermore, the government in cooperation with other stakeholders, should expand cancer centers and improve the quality of care of cancer patients at large

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the IRB of Addis Ababa University, College of Health Sciences, and informed consent to participate was obtained from the study participants. Since our research used human data, our study was performed in accordance with the relevant guidelines and regulations such as Helsinki declarations.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing Interest

The authors declare that they have no competing interests among them or with any other parties.

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Addis Ababa University provided the funding for this work.

Authors' contributions

E.D: Conceived, designed, wrote the proposal, collected the data, analyzed, interpreted the data, and wrote the manuscript. G.B. and H.T. conceived reviewed the proposal and manuscript. E.S. reviewed the manuscript and facilitated data collection at the site. All authors reviewed and approved the final manuscript.

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