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Title: Role of imaging in cervical cancer diagnosis & staging, a retrospective descriptive study, from September of 2022 up to February of 2023 in Tikur-Anbessa Specialized Hospital, Addis Ababa, Ethiopia.

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Acronyms and Abbreviations

AAU: ---------- Addis Ababa University

CC: ---------- Cervical cancer

CI: ---------- Confidence Interval

CT: ---------- Computed Tomography

HIV: ---------- Human Immuno Virus

HPV: ---------- Human Papilloma Virus

ICD: ---------- International Classification of Diseases

MRI: ---------- Magnetic Imaging Resonance

TASH: ---------- Tikur-Anbessa Specialized Hospital

US: ---------- Ultrasonography

WHO: ---------- World Health Organization

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SUMMARY

Background & Objectives: - In many developing countries cervical cancer is not only the most frequently occurring cancer among middle-aged women, but also a leading cause of death, partly due to poor access to medical care and the unavailability of routine screening in many of these countries. Staging of cervical carcinoma is done clinically using International Federation of Obstetrics and Gynecology (FIGO) guidelines. Computed tomography (CT) provides some information about the overall size of the cervix, but is inferior to MRI in staging of the primary cervical tumor due to its limited soft-tissue resolution. The study aims to determine the staging and imaging of cervical cancer at first diagnosis. Despite advancements in imaging technology and staging guidelines, cervical cancer diagnosis and staging remain a challenge. Accurate imaging techniques and proper staging at diagnosis are essential for effective treatment planning and improved outcomes.

Methods: - A quantitative retrospective descriptive statistic study was utilized to analyze the data collected from a 115 medical records of newly diagnosed cervical cancer patients, their disease stage at first diagnosis and the imaging modalities used in these patients in Tikur-Anbessa Specialized Hospital form September 2022 up to February of 2023.

Results: - It was found that 61 [53%] of patients had advanced clinical staging (stage IIIA–IVB) at the time of their cervical cancer confirmation, indicating a delayed diagnosis. Imaging results showed that the advanced disease stage reached 85 [73.9%] based on CT scans, which performed well in identifying distant disease spread. It was also found that there was a significant discrepancy in disease staging between clinical and CT based disease staging, with 63 [54.8%] disagreement rate

Interpretation and Conclusions: - The staggering prevalence of advanced-disease stage of cervical cancer during initial presentation of patients has rendered surgical intervention futile and has impeded the definitive disease staging objective of our study. This stark reality highlights the pressing need for early detection and intervention strategies to improve the prognosis and survival of our cervical cancer patients.

1. INTRODUCTION

1.1. Background

Worldwide, cervical cancer is the fourth most frequent cancer in women with an estimated 604 000 new cases in 2020. Of the estimated 342 000 deaths from cervical cancer in 2020, about 90% of these occur in low- and middle-income countries.[1] A large majority of cervical cancer (more than 95%) is due to the human papillomavirus (HPV). HPV is the most common viral infection of the reproductive tract. Most sexually active women and men will be infected at some point in their lives, and some may be repeatedly infected.[1] Women living with HIV are 6 times more likely to develop cervical cancer compared to women without HIV, and an estimated 5% of all cervical cancer cases are attributable to HIV. Moreover, in all world regions the contribution of HIV to cervical cancer falls disproportionately on younger women.[2] In Ethiopia, where almost 6.300 new cases are diagnosed annually, about 4.884 women die from cervical cancer each year. This makes cervical cancer the second-most common cancer in the country, and the second-most deadly cancer among Ethiopian women.[3] The country has a high incidence of cervical cancer and a low survival rate due in part to a lack of screening and late presentation of the disease. One of the major challenge of cervical cancer care is Ethiopia is delay in diagnosis, since most of the patients seek medical care at advanced stage of the disease.[4]

In many developing countries cervical cancer is not only the most frequently occurring cancer among middle-aged women, but also a leading cause of death, partly due to poor access to medical care and the unavailability of routine screening in many of these countries. One of the most important prognostic factors is how early the cancer is detected and how far it has spread.[5] Lack of cervical screening consequently leads to very advanced disease in African women. Whereas many cancers tend to have a high incidence in more urban areas, cervical cancer tends to have a higher incidence in more remote areas.[5] Human papilloma virus DNA testing is the recommended method of primary screening for cervical cancer if all resources are available.[6] The Papanicolau test (Pap smear) and VIA are other screening tests which have been used to detect premalignant lesions. Early detection of lesions with appropriate intervention reduces related morbidity and mortality. Countries that have established screening programs in the last few decades have seen a significant decline in incidence and deaths due to cervical cancer. [6]

Staging of cervical carcinoma is done clinically using International Federation of Obstetrics and Gynecology (FIGO) guidelines. It is based on physical examination findings and also includes results of biopsy, endoscopy and conventional radiological tests like chest radiograph, intravenous urography and barium enema. These conventional radiological investigations have largely been replaced by computed tomography (CT) and magnetic resonance imaging (MRI) at present. FIGO staging system does not consider CT and MRI mandatory; however, use of these modalities are encouraged.[7] Major limitations of clinical evaluation are in the assessment of parametrial and pelvic side wall invasion, estimation of tumour size (especially in endocervical tumour) and the evaluation of lymph node and distant metastasis. In revised FIGO guidelines, the use of cross-sectional imaging techniques is encouraged but not considered as mandatory.[7]

The FIGO staging system is fundamental for planning treatment strategies and prognostic classification of patients with cervical cancer. The 2014 FIGO cervical cancer staging system was revised in 2018 and featured two major changes. The first change was the addition of the third subtype to stage IB disease, which is now subdivided into stage IB1 (< 2 cm), stage IB2 (2–3.9 cm), and stage IB3 (≥ 4 cm). The introduction of a subcategory of tumors smaller than 2 cm (IB1) is justified because patients with tumors of this size have significantly better outcomes compared with those with tumors larger than 2 cm. The second major change was the inclusion of metastatic lymph node involvement in the staging system. Patients with metastatic disease to the lymph nodes are classified as having stage III disease, which is further sub-classified to stage IIIC1 (pelvic nodal metastasis) and IIIC2 (para-aortic nodal metastasis). This change is important not only for prognostic information but also to tailor treatment in these patients.[8]

Computed tomography (CT) provides some information about the overall size of the cervix, but is inferior to MRI in staging of the primary cervical tumor due to its limited soft-tissue resolution. CT is very useful in diagnosing hydronephrosis, a sign of stage III or higher disease, and detecting distant metastases. Overall, CT has an accuracy of 65% for staging cervical cancer and an accuracy of 86% for detecting metastatic lymph node involvement.[9] Magnetic resonance imaging (MRI) is the most sensitive and specific imaging modality for initial staging and follow-up of cervical cancer. MRI is highly accurate in evaluating the extent of disease in the cervix and tumor extension in the pelvis, thus impacting management and treatment options.[9]

One of the most important prognostic factors is stage at diagnosis, linking early-stage diagnosis with better chances of survival. Still most cervical cancer patients present at advanced stages in Ethiopia.[10] Studies examining predictors of late and advanced stage presentation of cervical cancer patients in low- and middle-income countries have been scarce. The relationship between HIV-infection and cervical cancer and the question of whether HIV-infection leads to more advanced cancer stages is discussed controversially. The time-span between symptom onset and diagnosis has been associated with stage at diagnosis, but other studies could not confirm this.[10] However, these studies were conducted in high-income countries where time to diagnosis is considerably shorter. It is unclear whether these results likewise apply to low-income countries such as Ethiopia, where time to diagnosis is long and patients present at advanced stages.[10]

Several previous studies from sub-Saharan African countries associated advanced-stage cervical cancer diagnosis with low-level community awareness of the disease and with lack of screening services and diagnostic facilities.[11] Literature indicates that over 80% of women with cervical cancer in developing countries are diagnosed at advanced stage.[12] And several studies have already indicated that advanced stage of cervical cancer at diagnosis is correlated with lower survival rates.[13]

1.2. Statement of the Problem

Early detection of cervical cancer is crucial for successful treatment and improved patient outcomes, and screening methods, such as the Pap smear and human papillomavirus (HPV) testing, have been shown to be effective in detecting precancerous lesions and early-stage cervical cancer. Despite the availability of screening methods, a significant number of women still present with advanced-stage cervical cancer at first diagnosis. Although cervical cancer can be prevented by detection and removal of precancerous lesions and treated successfully if detected early, most patients in Ethiopia and many other parts of Africa are diagnosed at advanced stage of the disease, when the choice of treatment is limited and the probability of survival is less.[11] In developing countries, due to poor availability of health services for early screening and diagnosis, patients often present with advanced stage disease, which is associated with a poor prognosis and high mortality rate. Additionally, cultural, social and demographic factors may be responsible for patients' presentation with late-stage disease.[14]

Staging and treatment decisions for cervical cancer are based on clinical FIGO (International Federation of Gynecology and Obstetrics) guidelines.[15] When compared with surgical staging, FIGO clinical staging results in under or over staging in 20-40 per cent patients.[16] Computerized tomography (CT) is widely used to improve clinical staging of cervical carcinoma. CT is useful in evaluating tumour size, parametrial invasion, lymph node status and distant metastasis which are all critical prognostic factors in cervical carcinoma.[15] The use of imaging is pivotal in accurate staging and development of treatment plans for patients with cervical cancer. Imaging provides information on tumor size, involvement of the parametrium, and nodal status, all of which have important prognostic implications. Available modalities include ultrasound (US), CT, MRI, FDG PET/CT, and FDG PET/MRI.[8]

Despite advancements in imaging technology and staging guidelines, cervical cancer diagnosis and staging remain a challenge.[17] Accurate imaging techniques and proper staging at diagnosis are essential for effective treatment planning and improved outcomes.[17] However, there is still a lack of consensus on the most reliable imaging modalities and staging methods for cervical cancer.

1.3. Rationale of the Study

Cervical cancer is a significant health issue for women worldwide, and early detection and treatment are crucial for improving outcomes. However, many patients present with advanced stages of the disease, making treatment more difficult and less effective.[1] The rationale for this study is to determine the staging and imaging of cervical cancer at first diagnosis in Tikur-Anbessa Specialized Hospital (TASH).

Staging of cervical carcinoma is done clinically using International Federation of Obstetrics and Gynecology (FIGO) guidelines. FIGO staging system does not consider CT and MRI mandatory; however, use of these modalities are encouraged. Imaging has become an important adjunct to the clinical assessment of uterine cancer.[15] When integrated with clinical findings, imaging findings can optimize cancer care and aid in the development of a treatment plan tailored to the individual patient.[15]

1.4. Significance of the Study

The study aims to identify the staging of Cervical Cancer at first diagnosis, predictors of advanced Stage during patient first time presentation and the imaging modalities used to stage, in Tikur-Anbessa Specialized Hospital. This information can be used to design effective screening programs and early intervention strategies, which can ultimately help reduce the number of cases of advanced stage cervical cancer and improve the health outcomes for women. In addition, there are limited research on the predictors of advanced stage and imaging modalities in these patients, and this study can contribute new information to the field and advance our understanding of the disease.

2. LITERATURE REVIEW

2.1. Sociodemographic and clinical characteristics

A very recent (2019) research study done in Tikur-Anbessa Specialized Hospital to study Factors Associated with Delayed Diagnosis of Cervical Cancer at TASH among a total of 410 who responded; The mean age of women was 50 years (SD ±11.5) with the range from 18–80 years. About 29.8% (122) and 30.2% (124) of the respondents were in the age groups of 35–44 and 45–54 years respectively. Regarding the region, 34.4% (141) and 31.2% (128) were from Oromia and Amhara respectively. Among the participants, 67.1% (275) of the respondents were Orthodox religion followers. Almost three quarters of the respondents (304) came from a radius greater than 100 kilometers to Tikur Anbessa Specialized Hospital oncology center.[18]

There was another study conducted as a retrospective cohort study among cervical cancer patients who registered at Tikur Anbessa Specialized Hospital (TASH), Addis Ababa, Ethiopia between September 2008 and September 2012, and from 1495 cases diagnosed with cervical cancer at their initial presentation, the mean age was 49 years (SD ±11.6 years). Known HIV-seropositive women presented at a mean age of 39 years, while patients with a negative or unknown HIV-status presented at a mean age of 50 years. One hundred thirty-five of the patients were tested HIV-seropositive (8.6%). Out of the 494 women screened for HIV, 135 women were screened positive and 359 were screened negative. The rest of the women where not screened. Of the HIV-seropositive women, 86.3% were on antiretroviral medication. Close to two thirds of the women came from rural areas.[10]

A population- based cross- sectional study done in Addis Ababa, Ethiopia with an incidental cervical cancer diagnosis from 1 January 2017 to 30 June 2018 among Addis Ababa residents; done among 212 histopathology confirmed new cervical cancer cases determined that the mean age of the study participants was 52.9 (±13.3) years, with the majority (68.4) being <60 years of age (68.4%), Christians (91.5%) and housewives (63.2%). Only 2.8% of the patients had a family history of cervical cancer. The majority of the patients (98.6%) were non- smokers; however, about a quarter (23.6%) of them were alcohol users. More than two- thirds (69.8%) of the patients had tumour size >4 cm. The majority of cervical cancer cases (91.0%) were a squamous cell carcinoma. About one in five (21.7%) patients with cervical cancer were HIV-positive, and all were on antiretroviral therapy.[11]

A study from neighboring African country of Uganda in which the Social, demographic and healthcare factors associated with stage at diagnosis of cervical cancer was studies from 149 women participants with cervical cancer pointed out that, the mean age (±SD) was 48±13 years and Fifty-seven per cent of participants were married; 45% reported no formal education and 89% were not formally employed while 39% of participants lived more than 100 km from the study hospital.[19] Another study from Sudan determined that the mean age of the patients at diagnosis was 54.5 (range 25–76) years and about 70% of the women were currently married with more than half living in a rural area of the country.[5]

2.2. Stage at diagnosis of cervical cancer

The recent TASH done study found that 86.3% (n=354) of patients had advanced stage (IIIA–IVB) or delayed diagnosis during confirmation of their cervical cancer and 72.0% (295) of the participants received radiotherapy. The median days of stay at home was 120 days with their symptoms. Of the first noticed participant symptoms, 36.8% (151) was foul smelling vaginal discharge and 32.4% (133) was vaginal bleeding.[18]

The study from Tikur-Anbessa done from September 2008 to 2012 pointed out that, most woman presented with advanced stages (55.2% stage IIIb or higher). Only 12.1% presented with an early FIGO-stage of I-IIa, making them eligible for surgery. The median patient interval was 30 weeks (range 0–526weeks). It was shorter for HIV-positive women (25 weeks) compared to women with a negative or unknown HIV-status (30 weeks). Rural women received their pathologic diagnosis after a median time of 32 weeks whereas women from one of the 10 largest cities in Ethiopia were diagnosed after a median time interval of 25 weeks.[10]

The population-based study of Addis Ababa residents showed, nearly two of three (60.4%, 95% CI: 53.8% to 66.5%) patients with cervical cancer were diagnosed at advanced stage, with 37.3% of them diagnosed at stage IV. Furthermore, for about 5.2% of the patients, the disease had metastasized to lung (2.4%), liver (2.4%) or peritoneum (0.5%) at diagnosis.[11]

Reviewing studies in our neighboring countries across Africa, a cross-sectional study done in Kenyatta National Hospital, Kenya to determine the Socio-demographic factors associated with advanced stage of cervical found that; 34.2% were in stage III, 30.3% in stage II, 19.7% in stage IV and 15.5% were in stage I. On categorizing stage III and IV as advanced stage and stage I and II as early stage, 53.9% and 46.1% had advanced and early stage of cervical cancer respectively.[13] A Ghanian district hospital based retrospective study determined that the late stage at presentation among cervical cancer cases was 65.97% (95% CI: 57.61– 73.65%).[6]

Another study from northwestern Tanzania conducted among 202 patients confirmed with cervical cancer determined that, 73 (36.1 %) were found in an early tumour stage and the prevalence of late stage cervical cancer was 63.9 %.[14]

There was also another study from a tertiary hospital in Northern Uganda which determined most of the participants had stage III (45%) or IV (21%) disease at diagnosis with Squamous cell carcinoma (75%) being the predominant histological subtype of cancer identified.[19]

A study of Pietersburg Hospital, South Africa (2012-2014) found that of a total of 273 cervical cancer patients, 62% of the patients presented with stage III, 27.8% with stage II, 7.3% with stage IV, 1.8% with stage I, and 0.7% were unspecified; and that it was evident that most of the patients presented with advanced stage cervical cancer at the hospital.[20]

The Sudanese study found; The proportion of women diagnosed at advanced stages of cervical cancer was higher than those diagnosed at an earlier stage (71.5% vs 28.4%). Women aged 54 years and older were more frequently diagnosed with advanced cervical cancer compared to those who were younger and also showed that women living in urban areas had a higher chance of being diagnosed earlier than those living in rural areas.[5]

2.3. Factors associated with advanced stage at diagnosis of cervical cancer

The TASH study done on the factors associated with delayed diagnosis concluded that the prevalence of delayed diagnosis of cervical cancer was high and also the median time of delay was long. Lack of awareness about cervical cancer disease and screening, practice in traditional healers and low-income level are the most responsible factors for high prevalence of delayed diagnosis of cervical cancer in Ethiopia.[18]

The Tikur-Anbessa study done from September 2008 to 2012, found that, known HIV-infection was associated with an almost 1.5-fold risk of diagnosis at a more advanced stage compared to those patients with a negative or unknown HIV-status (95% CI 1.05–2.1 p = 0.025). And the overall data suggested no association between place of residence, age and stage at diagnosis. It also found that longer patient intervals increased the risk of advanced stage cervical cancer diagnosis.[10]

The population-based Addis Ababa study concluded based on its bivariate analysis, advanced stage at diagnosis (stage III/IV) was significantly associated with source of medical expenses, not going to healthcare facilities immediately after symptom recognition, visiting more than three different healthcare facilities before diagnostic confirmation and total diagnostic interval >90 days. And it also has showed that the proportion of advanced- stage cervical cancer was considerably higher among women who waited for more than 3 months to receive diagnostic confirmation after they noticed symptom compared with those who waited for ≤3 months.[11]

The Kenyatta National Hospital study concluded, women aged 50 years to 75 years were about 4 times more likely to be diagnosed with advanced cervical cancer than to those women aged 18 years to 35 years, (AOR=4.25; 95% CI=1.08-16.75; P>0.05). Single women were found to have 2.28-fold risk of advanced cervical cancer during diagnosis than married women (AOR=2.28; 95% CI=1.03-5.06; P>0.05). HIV positive women were 2.86-fold more likely to be presented with advanced cervical cancer at diagnosis compared to HIV negative women (AOR=2.86; 95% CI=1.25-6.59; P>0.05) and after multivariable analysis, parity and geography origin were found insignificant with advanced diagnosis.[13]

The Pietersburg Hospital, South Africa study concluded that age had an effect on late presentation of the patients at the hospital. The mean age of the patients who presented with stage III cervical cancer was 56.9 years and for the ones who presented with stage IV was 62.5 years. The place of residence also played a role in late presentation of the patients at the hospital. More patients from remote areas of the province presented with advanced stage of cervical cancer as opposed to the ones who resided in areas that are nearer to the capital city of the province.[20]

2.4. Imaging utility and use in staging of cervical cancer

Diagnostic imaging during the primary diagnostic work-up is recommended to better assess tumor extent and metastatic disease and is now reflected in the 2018 FIGO stages 3C1 and 3C2 (positive pelvic and/or para-aortic lymph nodes). For pretreatment local staging, imaging by transvaginal or transrectal ultrasound (TVS, TRS) and/or magnetic resonance imaging (MRI) is instrumental to define pelvic tumor extent, including a more accurate assessment of tumor size, stromal invasion depth, and parametrial invasion. In locally advanced cervical cancer, positron emission tomography-computed tomography (PET-CT) or computed tomography (CT) is recommended, since the identification of metastatic lymph nodes and distant metastases has therapeutic consequences.[21]

The current staging system strives to adapt to all types of resource settings and does not mandate the use of a specific modality for staging. In fact, clinical staging may continue to be used where other techniques are not available. With the wide gamut of choices available, MRI definitely scores over other cross-sectional modalities in assessing the loco regional extent of disease, while PET-CT performs better in the detection of lymph nodes and small distant metastasis. In the event of nonavailability of MRI, PET-CT and pathology services, CT is a good modality for obtaining an overview of the local disease, distant metastasis, and detection of recurrence. TVS/TRUS can suffice in the case of small cervical masses.[22]

An article that systematically review the available evidence on the diagnostic performance of computed tomography (CT) and magnetic resonance imaging (MRI) in staging of cervical carcinoma determined that; from 57 articles that were included, Sensitivity estimates for parametrial invasion were 74% (95% C: 68–79%) for MRI and 55% (95% CI: 44–66%) for CT, and for lymph node involvement, 60% (95% CI 52%–68%) and 43% (95% CI: 37–57%), respectively. MRI and CT had comparable specificity for parametrial invasion and lymph node involvement. For bladder invasion and rectum invasion the sensitivities for MRI were respectively 75% (95% CI: 66–83%) and 71% (95% CI: 53–83%), higher compared with CT. The specificity in evaluating bladder invasion for MRI was significantly higher compared with CT: 91% (95% CI: 83–95%) for MRI and 73% (95% CI: 52–87%) for CT. The specificity for rectum invasion were comparable. Differences in patient sample size, publication year, methodological criteria, and MRI techniques had no effect on the summary estimates.[23]

A study done on 53 women diagnosed with cervical carcinoma and which were evaluated with contrast enhanced CT scan of abdomen and pelvis, concluded that; there was a poor agreement between clinical and CT staging of cervical carcinoma. Primary tumour was demonstrated on CT in 36 (70%) of 53 patients. CT underestimated the parametrial, vaginal and pelvic wall invasion when compared with physical examination. CT overestimated the urinary bladder and rectal invasion when compared with cysto-sigmoidoscopy, however, CT had 100 per cent negative predictive value (NPV) to exclude bladder and rectal involvement. CT detection of lymph node enlargement and lung metastases influenced the management. [7] The findings of the study showed that CT scan does not reliably correlate with clinical FIGO staging of cervical cancer. However, it can detect urinary obstruction as well as nodal or distant metastases and thus improves the clinical FIGO staging. [7]

A prospective study on 26 patients with pathologically proven cervical malignancies performed by using post-contrast MDCT of the abdomen and pelvis for local staging showed; the overall

accuracy of CT was 61.5% excluding the discrepancy in staging between CT and examination under anesthesia (EUA) due to distant metastases (three cases had distant metastases in CT which was not evaluated in EUA) and the study concluded CT gave better results in staging of advanced cases than in early staged ones plus local staging was improved by acquisition of delayed scans.[24]

Another retrospective study included 37 patients with histologically confirmed cervical cancer in the gynecology tumor clinic, and the results shows that the correlation of overall clinical and MRI staging by percent agreement is moderate (73.9%), but the kappa coefficient showed a slight correlation.[25] The correlation of clinical and MRI findings in the vaginal invasion, pelvic sidewall invasion, adjacent pelvic organ invasion, and spreading to distant organ also showed moderate-to-strong correlation by percent agreement (ranging from 67.6 to 91.9%) but slight correlation between clinical and MRI examinations by kappa or weighted kappa coefficient (K = 0.000–0.128w).[25]

The files of 255 patients with biopsy-proven cervical carcinoma receiving primary surgical treatment at the Department of Obstetrics and Gynecology of Ulm University between 1992 and 2003 were analyzed retrospectively and showed; After stratification for palpation, the results with CT and MRI were no better than with palpation (accuracy: CT 61% and 54%, MRI 61% and 56%, respectively). The sensitivity of CT and MRI for detecting lymph node metastasis was also poor (36% and 35%, respectively).[26]

Although cervical cancer staging is based on clinical assessment, there is a wide use of cross-sectional imaging [magnetic resonance imaging, computed tomography (CT), positron emission tomography-CT] in the pre- and post-treatment work up of these patients. Imaging may provide important information for the discrimination between operable and advanced cervical cancer, the evaluation of tumor response to therapy and the detection of recurrent disease.[27]

3. RESEARCH QUESTIONS AND OBJECTIVES

3.1. Research questions

The purpose of this study is to investigate the staging of cervical cancer at first diagnosis, determine the prevalence of advanced disease stage, identify the predictors for advanced disease stage at diagnosis and the imaging modalities used during their initial disease staging, in Tikur-Anbessa Specialized Hospital from an analysis done over the time frame of 6 months from September 2022 up to February of 2023.

3.2. Objectives

3.2.1. General objective

To determine the staging and imaging of cervical cancer at first diagnosis.

3.2.2. Specific objectives

1) To determine the stage of cervical cancer at diagnosis.
2) To assess the prevalence of advanced cervical cancer at initial encounter.
3) To determine factors associated with advanced disease stage.
4) To identify the imaging modalities used and the imaging-based stage of the disease in those patients.
5) To assess the staging difference between clinical staging and imaging-based staging.

4. METHODS

4.1. Study Area

The study was conducted at Tikur-Anbessa Specialized Hospital, Addis Ababa, Ethiopia which is the largest referral hospital for Ethiopia as a whole receiving many patients, especially, patients suffering from different types of cancer including cervical cancer. It is one of the leading referral hospitals to accept, diagnose and treat cervical cancer patients.

4.2. Study Design

A quantitative retrospective descriptive statistic study by reviewing records was utilized to analyze the data collected from the medical records of newly diagnosed cervical cancer patients in Tikur-Anbessa Specialized Hospital form September 2022 up to February of 2023.

4.3. Source and Study Population

The source of the study are all cervical cancer patients presenting to the Tikur-Anbessa Specialized Hospital and the study consisted of cervical cancer patients who have been staged for the disease based on the FIGO staging method during their first-time presentation and diagnosis.

4.4. Eligibility Criteria

4.4.1. Inclusion Criteria

- ✓ Patients who have been diagnosed with cervical cancer for the first time.
- ✓ Patients who have been diagnosed and staged for their cervical cancer at first diagnosis.
- ✓ Patients who have undergone a complete diagnostic evaluation, including a biopsy and imaging studies.
- ✓ Patients who have not received any previous treatment for cervical cancer or any other cancer.
- ✓ Patients with complete medical records, including information on cervical cancer diagnosis, stage of the disease and further personal information written down.

4.4.2. Exclusion Criteria

- Patients for whom the diagnosis of cervical cancer is not properly settled based on histopathology and imaging.
- Patients who have a previous history of cervical cancer treatment (i.e., those who received radiation or chemotherapy in the past)
- Patients who have a history of other cancer for which they are receiving treatment for (either chemo or radiotherapy)
- Patients diagnosed with cervical cancer but no imaging modalities was implemented for their disease staging.

4.5. Sample Size Determination

The medical records of all first-time cervical cancer patients registered on the hospitals I-Care system from September 2022 up to February of 2023 was examined. After checking and clearing for duplications in the registrar number of the patients, a total of 115 cases were evaluated.

4.6. Sampling Procedure

All first time presenting cervical cancer cases between September 2022 up to February of 2023 were studied for the research activities.

4.7. Data Collection

The total number of medical record numbers (MRNs) for first-time cervical cancer cases was retrieved from the hospital's administration portal software. The research time-frame spanned from September 2022 to February 2023, as ICD-based patient file registration commenced after August 2022. A six-month time-frame was utilized to align with the research study's duration. Demographic variables, including age, race, place of residence, marital status, HIV serostatus, complete diagnosis, stage of cancer, and imaging modalities performed, were extracted from the patients' records (specifically the institutional databases of ICARE and MEDWEB) for all cases

4.8. Variables

4.8.1. Dependent Variables

- Cancer stage at first diagnosis: measured on a scale of FIGO (International Federation of Gynecology and Obstetrics) staging system, which ranges from stage I (early-stage cancer) to stage IV (advanced-stage cancer).
- Advanced stage at first diagnosis of cervical cancer: According to the International Federation of Gynecology and Obstetrics (FIGO) staging system, advanced cervical cancer means that the cancer has spread from the cervix to another part of the body, such as the lymph nodes, liver, lungs, or bones. It can also refer to a large tumor within the cervix or the cancer having grown into the tissues around the cervix.

4.8.2. Independent Variables

- Patient demographics; Age, race, religion and place of residency.
- HIV serostatus: designated as HIV positive or negative.
- Imaging modalities performed during disease staging; Ultrasonography (US), CT and MRI.
- Latency period: The time interval between the onset or appearance of the cervical cancer symptoms and patient seeking medical attention.
- Histopathologic subtype of the cervical cancer; either squamous-cell, Adenocarcinoma or another subtype.
- Environmental and behavioral factors such as distance from TASH (Addis Ababa), region of residency, parity and occupation.

4.9. Limitation of the study

A potential limitation of this study is its reliance on retrospective data obtained through the newly implemented ICD-based patient registration system. Because physicians may still be unfamiliar with this system, there is a possibility that not all patients are being registered, leading to an underestimation of the actual data during the study collection period. Consequently, the study may not fully capture the prevalence and predictors of advanced-stage cervical cancer at first diagnosis among patients presenting to Tikur-Anbessa Specialized Hospital.

4.10. Operational Definition

- Cervical cancer: presence of malignant growth of cells in the cervix, as confirmed by histopathology
- Cervical Cancer Staging: Tumors staged according to guidelines set by the International Federation of Gynecology and Obstetrics (FIGO)

Figure 1 - Cervical Cancer Staging According to 2018 FIGO Staging System

TABLE 2: Cervical Cancer Staging According to the 2018 FIGO System

Stage	Description
I	Tumor confined to cervix (extension to uterine body should be disregarded)
IA	Invasive tumor that can be diagnosed only by microscopy, maximum depth of stromal invasion < 5 mm
IA1	Maximum depth of stromal invasion is < 3 mm
IA2	Maximum depth of stromal invasion is ≥ 3 and < 5 mm
IB	
IB1	Invasive tumor ≥ 5 mm and < 2 cm in greatest dimension
IB2	Invasive tumor ≥ 2 cm and < 4 cm in greatest dimension
IB3	Invasive tumor ≥ 4 cm in greatest dimension
II	Tumor extends beyond the uterus (no involvement of lower third of vagina or pelvic sidewall)
IIA	Involvement up to upper two-thirds of vagina, no parametrial involvement
IIA1	Invasive tumor < 4 cm
IIA2	Invasive tumor ≥ 4 cm
IIB	Parametrial involvement not to the pelvic wall
III	Involvement of lower third of vagina, extension to the pelvic wall, hydronephrosis or nonfunctioning kidney, lymph node involvement (irrespective of tumor size and extent), or some combination of these
IIIA	Involvement of lower third of vagina but no pelvic wall involvement
IIIB	Extension to pelvic wall, hydronephrosis or nonfunctioning kidney (not secondary to other causes), or both
IIIC	Pelvic and paraaortic lymph node metastasis (irrespective of tumor size and local extension)
IIIC1	Pelvic lymph node metastasis
IIIC2	Paraaortic lymph node metastasis
IV	Extension beyond the true pelvis or biopsy-proven involvement of bladder or rectal mucosa
IVA	Involvement of adjacent pelvic organs
IVB	Distant metastasis

Note—When the appropriate stage is in doubt, the lower stage should be assigned. In respect to tumor size and extent, when available, imaging and pathologic findings can be used to supplement clinical findings, with an added notation of r (imaging) and p (pathology). FIGO = International Federation of Gynecology and Obstetrics. Adapted with permission from [6].

- Advanced stage at first diagnosis: According to the International Federation of Gynecology and Obstetrics (FIGO) staging system, advanced cervical cancer means that the cancer has spread from the cervix to another part of the body, such as the lymph nodes, liver, lungs, or bones. It can also refer to a large tumor within the cervix or the cancer having grown into the tissues around the cervix.
- Time intervals: defined as the time interval between the date the patient noticed the first symptom and the date, she visited healthcare.

4.11. Data Management

Patient data from hospital database systems was collected and organized into an Excel spreadsheet using Google Forms. This data was then imported into SPSS 26 for analysis. Missing values, outliers, and other inconsistencies were identified and removed from the datasets. The cleaned data was further processed using Excels frequency, sort, and list functions to ensure its accuracy and consistency. Finally, the cleaned data was exported to SPSS version 26 for further analysis and interpretation using Epi Info statistical software. The results were presented in the form of frequencies and percentages.

4.12. Data Quality Assurance

To maintain data integrity, a standardized questionnaire adapted from previous studies was utilized. The questionnaire was exclusively in English. The study's overall activities were meticulously monitored by the primary investigator and supervisors. To enhance patient recall, information accuracy, and result consistency, patient data was extracted from the official I-CARE and MEDWEB databases of Tikur-Anbessa Specialized Hospital.

4.13. Ethical Consideration

I took ethical clearance and official letter from Research and Ethics committee of the department of radiology. Confidentiality was maintained by keeping information anonymous and ensuring that it was not available to anybody other than researcher.

4.14. Dissemination of the Results

Addis Ababa University, School of Medicine and the Department of Radiology will receive my results of the research study. In addition, the research findings will be presented in a seminar presentation and if possible, published in a peer-reviewed journal. Publication will also be used to communicate the findings.

5. RESULT

5.1. Sociodemographic and clinical characteristics

A total of 115 patients were newly presented to Tikur-Anbessa Specialized Hospital for cervical cancer during a 6 months period from September of 2022 up to February of 2023. The age distribution of these patients was quite diverse, with ages ranging from 28 to 90 years. The mean age of the women in this group was 53 years (SD ±12 years), indicating a moderate spread around the mean. The age distribution further reveals that a significant proportion of the patients were middle-aged. Specifically, 32 [27.8%] patients were in the age group of 41–50 years and 31 [27.0%] were in the age group of 51–60 years.

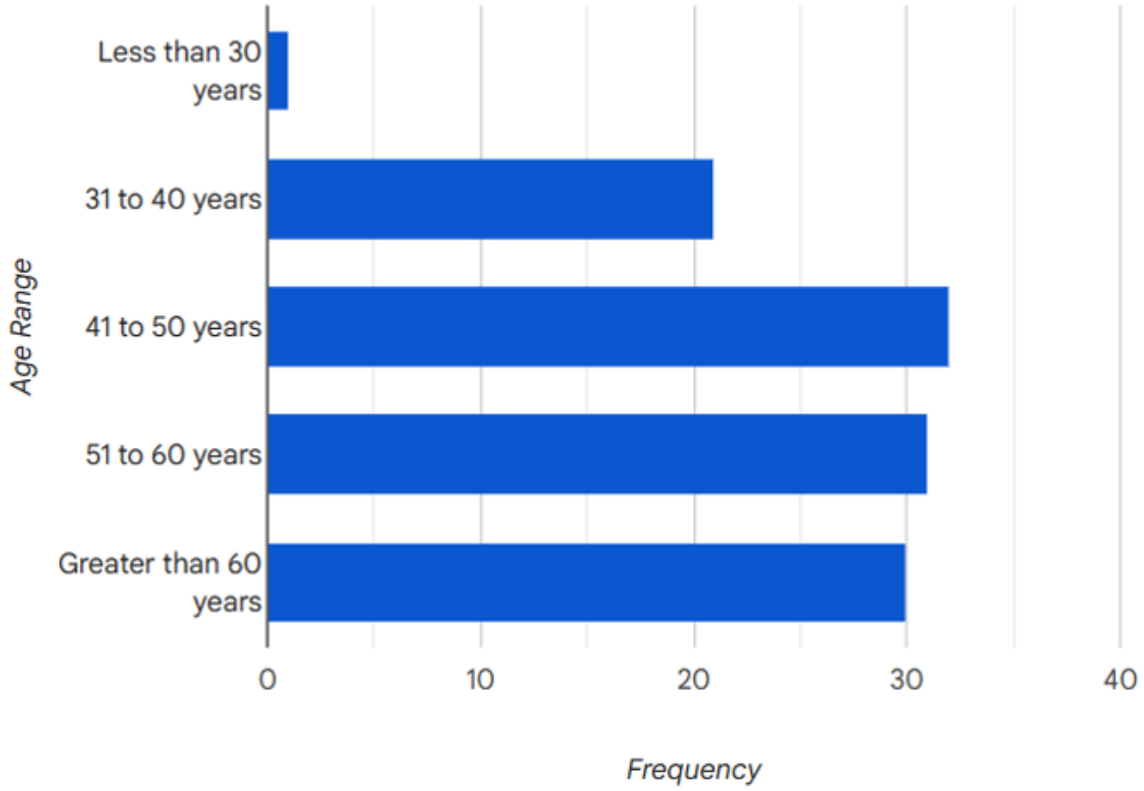

Table 1:Age range of the patients

In terms of regional distribution, the majority of patients were from Addis Ababa 41 [35.7%], followed by Oromia 31 [27%], and Amhara 26 [22.6%]. The regions of Afar, Benishangul, Harari, and Tigray had the least representation with only one patient each. When comparing urban and rural residency, more patients were from rural areas 66 [57.4%] than from urban regions 49 [42.6%]. Religious affiliation was also recorded, with the majority of patients being Orthodox 69 [60%], while 28 [24.3%] were Protestant. A significant proportion of the patients 71 [61.7%] traveled from areas located more than 100 kilometers away from the hospital.

Table 2: Regional distribution of patients.

Patients' regional distribution		
Region	**Frequency**	**Percent (%)**
Afar	1	0.9
Addis Ababa	41	35.7
Amhara	26	22.6
Benishangul	1	.9
Dire Dawa	2	1.7
Harari	1	.9
Oromia	31	27.0
SNNP	9	7.8
Somalia	2	1.7
Tigray	1	0.9

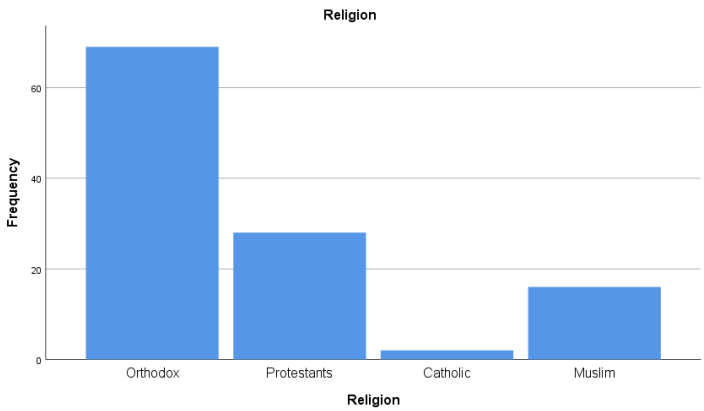

Table 3:Religious affiliation of the patients

In terms of lifestyle factors, 104 [90.4%] were non-smokers. The majority of patients were married 63 [54.8%], and a large proportion 82 [71.3%] reported having more than two children. Most patients 79 [68.7%] denied having multiple sexual partners, and almost all 113 [98.3%] were unaware of their HPV serostatus.

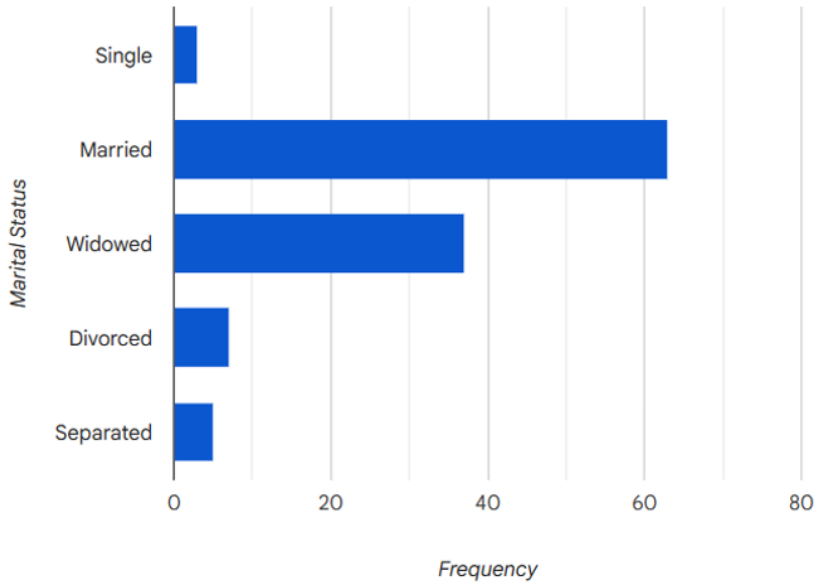

Table 4:Marital status of the patients

Clinically, the most common histopathologic sub-type of cervical cancer was squamous cell carcinoma (SCC), accounting for 96 [83.5%] of the cases, followed by adenocarcinoma 14 [12.2%]. The first noticed symptoms varied, with 50 [43.5%] experiencing vaginal bleeding and 48 [41.7%] reporting foul-smelling discharge and pain with intercourse in addition to bleeding. There was a delay in seeking medical attention, with 31 [27%] of patients waiting for 6-12 weeks before doing so, and only 6 [5.2%] presenting in less than a month.

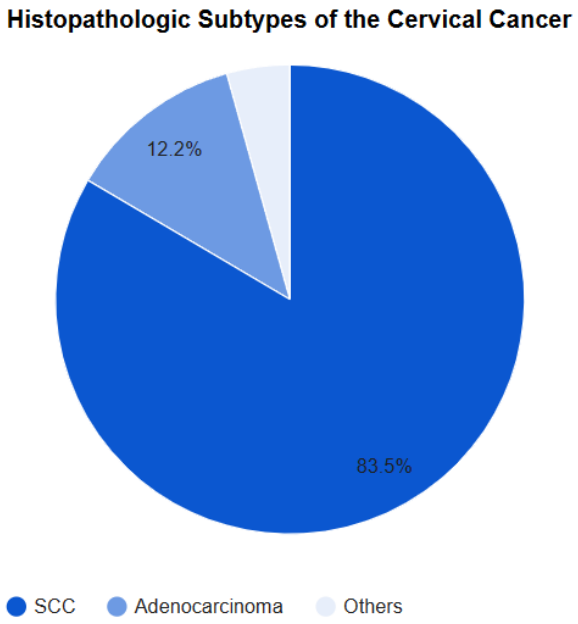

Figure 2:Histopathologic subtype of cervical cancer

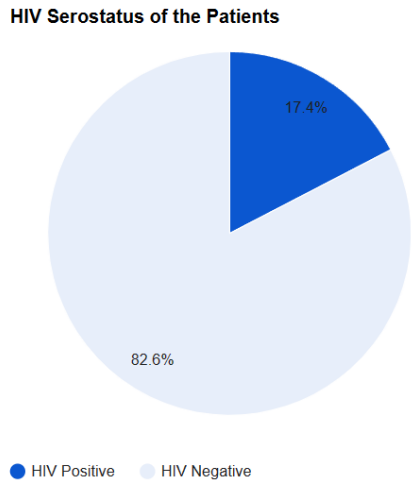

Figure 3:RVI serostatus of the patients

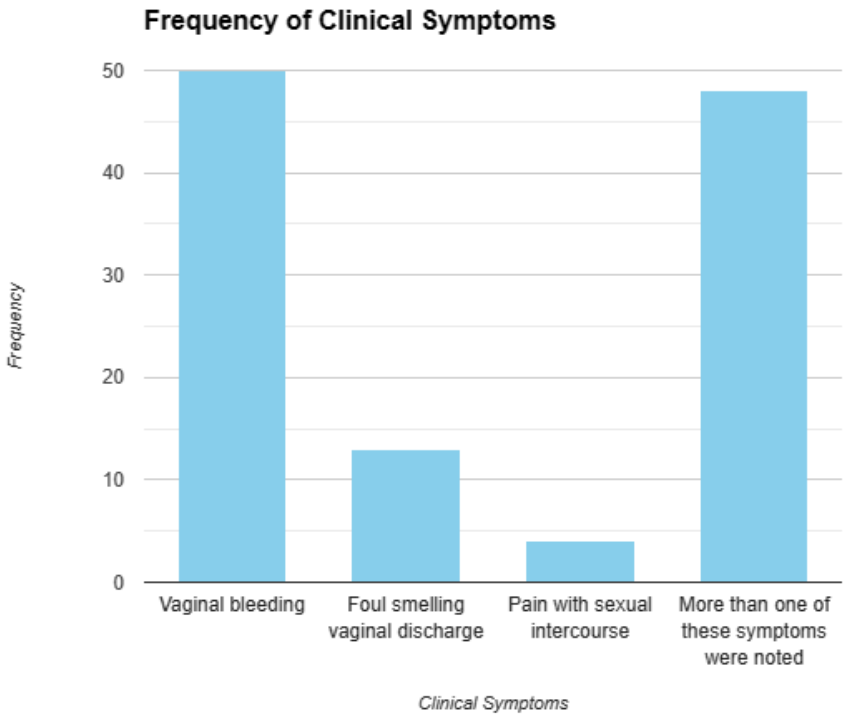

Table 5:Bar chart representation of the clinical symptoms

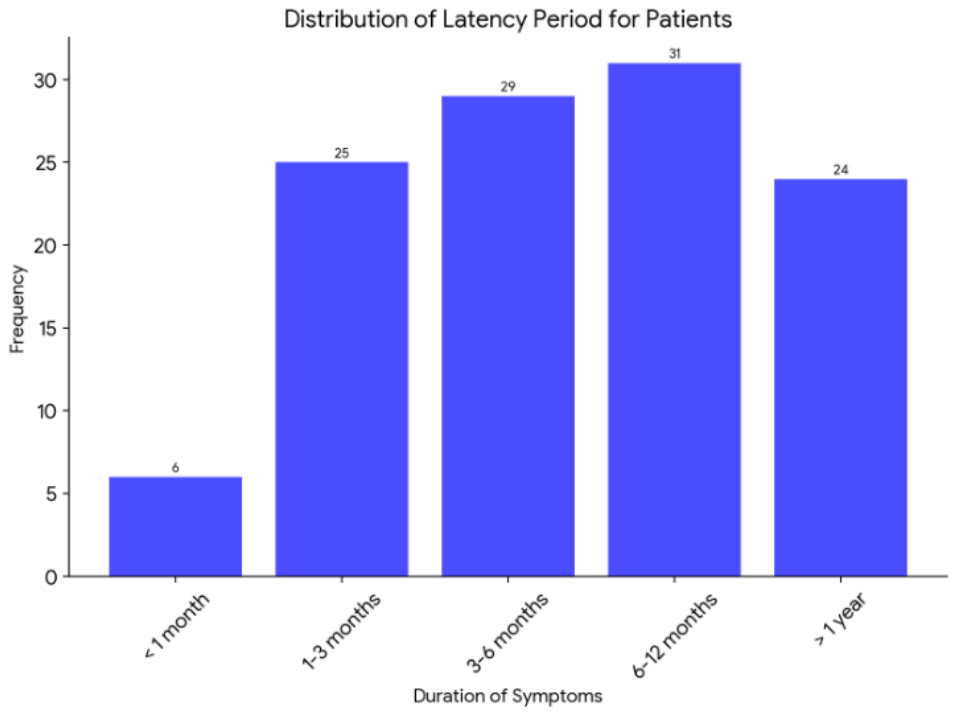

Table 6:Duration of symptom (latency period of symptoms)

5.2. Stage at diagnosis of cervical cancer

It was found that 61 [53%] of patients had advanced clinical staging (stage IIIA–IVB) at the time of their cervical cancer confirmation, indicating a delayed diagnosis. Imaging results showed that the advanced disease stage reached 85 [73.9%] based on CT scans, which performed well in identifying distant disease spread. A significant number of women 51 [40%] presented with advanced clinical stages (stage IIIb or higher), while only 19 [16.5%] presented with an early FIGO-stage of I-IIa, making them eligible for surgery.

The Clinical staging at diagnosis		
Clinical stage	**Frequency**	**Percent (%)**
Stage IB	2	1.7
Stage IIA	17	14.8
Stage IIB	30	26.1
Stage IIIA	15	13.0
Stage IIIB	24	20.9
Stage IIIC	3	2.6
Stage IVA	19	16.5
Specific clinical stage not written	5	4.3

Table 7: Clinical staging at diagnosis

The CT imaging-based stage of the disease at diagnosis?		
CT stage	**Frequency**	**Percent (%)**
CT Stage IIA	11	9.6
CT Stage IIB	11	9.6
CT Stage IIIA	3	2.6
CT Stage IIIB	16	13.9
CT Stage IIIC	11	9.6
CT Stage IVA	42	36.5
CT Stage IVB	13	11.3
Not Staged by CT	8	7.0

Table 8: CT imaging-based stage of the disease

The study also explored correlations between advanced disease stage and various factors. A weak association was found between advanced stage at diagnosis (stage III/IV) and distance from TASH, Addis Ababa (r-value of 0.278 and a p-value of 0.003). However, no correlation was found between advanced disease stage and age, religion, marital status, latency period, HIV-serostatus, and Histopathologic sub-type of cervical cancer.

5.3. Imaging utility and use in staging of cervical Cancer

It was found that there was a significant discrepancy in disease staging between clinical and CT based disease staging, with 63 [54.8%] disagreement rate. CT over-staged almost half of the cases 55[47.8%], while it agreed with only 46 [40.0%] of the cases. In 6 [5.2%] of the cases, the study could not determine the staging due to inadequate conclusion by the reporting radiologist.

Comparison of clinical with the CT staging		
Comparison	**Frequency**	**Percent (%)**
The CT over staged the disease compared to the clinical staging initially given	55	47.8
The CT under staged the disease compared to the clinical staging initially given	14	12.2
The clinical and CT staging were similar	46	40.0

Table 9: Comparison of clinical with the CT staging

The study also compared the results of CT and MR for local disease staging. It was found that CT missed the primary tumor in 6 [5.2%] of the patients, while MR demonstrated it in all cases. MR also over-staged the initial clinical staging in 16 [13.9%] cases, while it agreed with only 15 [13.0%] cases. MR under-staged the initial clinical staging in 3 [2.6%] cases, but this did not affect the management course.

Comparison of clinical based local staging with the MRI local staging		
Comparison	**Frequency**	**Percent (%)**
The MRI over staged the local staging compared to the clinical stage initially given	16	13.9
The MRI under staged the local staging compared to the clinical stage initially	3	2.6
The clinical and MRI staging were similar	15	13.0
Total MR reviewed cases	34	29.6

Table 10: Comparison of clinical based local staging with the MRI local staging

The study also reported the tumor size, local invasion, and distant metastasis of the patients based on CT imaging. It was found that 73 [63.5%] of the patients had tumor size >4 cm, and 40 [34.8%] having tumor size >6 cm at diagnosis. Local invasion of the bladder or rectum was inferred in 49 [42.6%] of cases, while CT could not assess it in 12 [10.4%] cases. Bilateral hydronephrosis was identified in 46 [40.0%] of cases, while unilateral involvement was seen in 12 [10.4%]. Distant metastasis to the lung, liver, or bone was detected in 15 [13.0%] of which 10 [8.7%] is to the lung, 3 [2.6%] is to the liver and 2 [1.7%] to the bone.

Estimated largest tumor diameter on CT imaging		
Tumor size in Cm	**Frequency**	**Percent (%)**
3 to 4 cm size	14	12.2
4 to 5 cm size	16	13.9
5 to 6 cm size	17	14.8
> 6 cm	40	34.8
Ill-defined mass whereby the estimated size in cm's was not measured	22	19.1
No discrete cervical region mass visualized	6	5.2

Table 11: Estimated largest tumor diameter on CT imaging

Of the 115 cases studied, only 34 [29.6%] proceeded to have further MR imaging for disease staging. In 5 [14.7%], the primary tumor was not detected on the CT scan, hence CT staging was not carried out. For one particular case, the primary tumor was identified via CT scan, but due to difficulties in assessing local invasion, CT staging was not assigned. In another 5 cases, the primary tumor was discernible but not quantified on the CT scan due to its indistinct characteristics.

When comparing local invasion assessments between CT and MRI, out of the 34 cases that underwent both imaging modalities, both CT and subsequent MRI confirmed bladder/rectum invasion in 9 cases. However, in 2 cases where CT reported uncertain invasion (i.e., fat plane loss with bladder/rectum), MRI concurred with one but disagreed and downgraded the other to stage IB3. Furthermore, in 9 cases, both CT and subsequent MRI were in robust agreement about the primary disease's invasion into the parametrium/pelvic sidewall.

In the evaluation of nodal metastasis among the 34 patients who underwent both CT and MRI scans. The MRI detected pelvic regional nodes in 4 patients that were not identified in the initial CT scan. However, in 2 other cases, both CT and MRI concurred on the presence of retroperitoneal nodal metastasis.

6. DISCUSSION

The study investigated the epidemiological and clinical characteristics of cervical cancer patients among newly presenting women to Tikur-Anbessa Hospital over a 6 months period starting from September of 2022 up to February of 2023 and found that the majority of newly presenting patients are middle-aged women, the majority traveling from distant rural locations and most were married, and Orthodox. The study found that squamous cell carcinoma was the most common histopathologic sub-type of cervical cancer, and that vaginal bleeding was the most common symptom. It also highlighted the delay in seeking medical attention among cervical cancer patients with the majority presenting at an advanced stage, which could affect their prognosis and survival. The findings of this research align with previous studies from Ethiopia[10, 11, 18] and those conducted in other neighboring African countries[5, 19]. The age distribution, regional distribution, lifestyle factors, and clinical characteristics of cervical cancer patients in Ethiopia are consistent with the broader trends observed across Africa.[5, 10, 11, 18, 19] For instance, the predominance of squamous cell carcinoma as the most common histopathologic sub-type of cervical cancer is a trend that has been observed in other African countries and previous similar studies from our country as well[11, 19]. Similarly, the delay in seeking medical attention among cervical cancer patients is a common issue across Ethiopia and Africa. Moreover, the high proportion of patients from rural areas and the significant number of patients traveling from areas located more than 100 kilometers away from the hospital are similar trends that have been noted.[5, 10, 11, 18, 19] These similarities underscore the shared challenges in cervical cancer prevention and treatment across Africa and highlight the need for continent-wide strategies to address these issues.

The study shows that more than half of cervical cancer patients had advanced clinical stages (stage IIIA–IVB) when they were confirmed to have the disease. Moreover, almost three-quarters of them had advanced disease stages based on CT scan staging. These findings of the study are consistent with previous studies that report high rates of advanced cervical cancer diagnosis in low- and middle-income countries of Africa including Ethiopia.[5, 6, 10, 11, 13, 14, 18-20]

The study also found a weak correlation between the advanced disease stage and distance from the hospital (Tikur-Anbessa) in Addis Ababa. This implies possible challenges in accessing healthcare services, which was also implicated in previous study from Pietersburg Hospital, South Africa [20] that need further exploration. However, it differs from some studies that find associations between advanced disease stage and other factors such as age, HIV status, and histopathology. [10, 11, 13, 18, 20]. This discrepancy could be explained by the limited sample size and restricted inclusion from a single hospital in our study which may have influenced the study's findings. A larger, multicenter study would be necessary to provide a more generalizable result.

The study's findings revealed a substantial discrepancy between clinical and CT-based disease staging of cervical cancer, with over half of the cases being overstaged by CT. This discrepancy between clinical and CT-based staging aligns with the conclusions of previous studies, which have also demonstrated the poor agreement of clinical FIGO staging of cervical cancer with that of CT scan based staging.[7]

The comparison between CT and MR for local disease staging based on our results revealed that MR is more accurate and sensitive than CT in detecting the primary tumor and local invasion. Computed tomography (CT) provides some information about the overall size of the cervix, but is inferior to MRI in staging of the primary cervical tumor due to its limited soft-tissue resolution.[9] Magnetic resonance imaging (MRI) is the most sensitive and specific imaging modality for initial staging and follow-up of cervical cancer. MRI is highly accurate in evaluating the extent of disease in the cervix and tumor extension in the pelvis, thus impacting management and treatment options.[9]

It has been observed that the possibility of missing the primary tumour in CT is higher when the tumour size is small and hence, normal CT does not exclude presence of the cervical cancer.[28] Despite the majority of our patients presenting with large primary tumors (>4 cm), CT scans failed to detect the primary tumor in 5 (14.7%) of the 34 cases that subsequently underwent MR imaging. These findings may be due to several factors: inconsistency in CT scans, limitations of CT for soft tissue, differences in how the interpreting radiologists interpreted the scans (i.e., intra- plus inter-observer variability), and the small number of patients studied. Conducting a prospective study with a larger and more diverse sample is recommended to clarify the observed discrepancies and provide a more accurate assessment of CT scan performance.

Out of the 115 cases evaluated, only 34 (29.6%) underwent subsequent MR imaging for disease staging. MR imaging effectively identified the primary tumor in all 34 cases, whereas the initial CT scan failed to detect the primary tumor in 5 (14.7%) of these cases. This finding corroborates previous research emphasizing the limitations of CT in cervical cancer imaging. Studies have shown that up to 50% of cervical tumors exhibit similar density to the surrounding cervical stroma on contrast-enhanced CT, making them invisible on CT scans.[28] This study also showed that MRI is the imaging modality of choice for local staging of cervical carcinoma as

was the conclusion of previous study by Balleyguier C et al.[29] Despite the recognized importance of MRI in disease staging, less than third of the assessed cases underwent this diagnostic procedure due to the limited availability of MRI services at the hospital during the study period, coupled with the financial constraints faced by many patients and the high cost of MR imaging, hindered the widespread utilization of this valuable imaging modality.

The incidence of hydronephrosis associated with cervical cancer at the time of initial presentation was notably high (50.4%), significantly exceeding the rate reported in a previous study that found hydronephrosis secondary to ureteric involvement in only 12 (22.6%) out of 53 patients.[7] The higher incidence of advanced-stage disease among our patients likely accounts for this discrepancy.

Evaluating bladder/rectum invasion in the 34 patients who underwent both CT and MRI, both modalities concurred in 9 cases. However, CT and MRI disagreed in 2 cases where CT indicated uncertain invasion. CT's accuracy in detecting local invasion is consistent with previous studies, demonstrating comparable proficiency in identifying bladder involvement. In a previous study involving 53 patients, CT revealed definite bladder involvement in eight patients and suspected involvement in six patients.[7] As per the FIGO guidelines all patients with cervical cancer should undergo cystoscopy and biopsy to detect involvement of bladder mucosa.[30] The absence of cystoscopy evaluation for bladder involvement in our study population precludes a definitive conclusion.

The prevalence of pelvic and retroperitoneal nodal involvement detected by CT in our study (18.2% and 17.4%, respectively) closely aligns with findings from a previous study (20.8% and 9.5%, respectively).[7]

The major limitations of FIGO staging are the discrepancies with surgical staging, inability for lymph nodal assessment and variable intra- and inter-observer variability which would adversely affect treatment decisions.[28] Despite employing clinical and CT staging for all study groups, with a subset undergoing subsequent MR imaging for local staging, the overwhelming prevalence of advanced disease stages rendered our patients ineligible for surgical intervention and hindered the definitive disease staging objectives of the study.

7. CONCLUSION

This study provides valuable insights into the epidemiological and clinical characteristics of cervical cancer patients newly presenting to Tikur-Anbessa Specialized Hospital which align with previous studies from the country and other African regions, emphasizing the shared challenges in cervical cancer prevention and treatment across the continent. The study found a high prevalence of advanced-stage cervical cancer among newly diagnosed patients, consistent with previous studies. The observed weak correlation between advanced disease stage and distance from the hospital suggests potential healthcare access challenges that warrant further investigation. The study also highlighted the significant discrepancies between clinical and CT-based cervical cancer staging, with CT overstaging occurring in over half of the cases. The findings reinforce the limitations of CT for cervical cancer imaging and underscore the superiority of MRI in accurately detecting the primary tumor and local invasion. The observed discrepancies between staging methods could have profound implications for treatment decisions and patient outcomes. Ultimately, the staggering prevalence of advanced-disease stage of cervical cancer during initial presentation of patients has rendered surgical intervention futile and has impeded the definitive disease staging objective of the study.

This stark reality highlights the pressing need for early detection and intervention strategies to improve the prognosis and survival of our cervical cancer patients, which includes the comprehensive approach encompassing prevention, early detection, and accurate diagnosis. Promotion of early medical consultation for women experiencing any potential symptoms of cervical cancer is essential for timely intervention and that Pap smears for women within the recommended age range plays a vital role in early detection. Advocating for the increased availability and accessibility of high-quality diagnostic modalities, such as MRI, is crucial for accurate cervical cancer staging, guiding appropriate treatment decisions and improving patient outcomes. Finally, conducting further research to identify and address potential barriers to healthcare access that may contribute to delayed diagnosis and advanced-stage cervical cancer presentation is essential to refine strategies and optimize patient care.

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9. ANNEXES

Annex I: Questionnaire

Serial number	Question	Response
0.0	MRN	MRN: _____
1.0	Age in number	_____Years old.
1.1	Age in range	A. Less than 30 years B. 31 to 40 years C. 41 to 50 years D. 51 to 60 years E. Greater than 60 years
1.2	Level of education?	A. No formal education B. Primary (1-8) C. Secondary (9-10) D. Preparatory E. Diploma or technical/vocational F. Higher (bachelor degree and above)
1.3	Marital status?	A. Single B. Married C. Widowed D. Divorced E. Separated
1.4	Occupational status?	A. House wife B. Merchant C. Daily laborer D. Governmental employee E. Private/NGO employee

1.5	Region of residency?	A. Afar B. Addis Ababa C. Amhara D. Benishangul E. Dire Dawa F. Gambela G. Harari H. Oromia I. SNNP J. Somalia K. Tigray
1.6	Place of residence?	A. Urban B. Rural
1.7	Distance from TASH, Addis Ababa in Km	A. Less than in 100km diameter B. More than 100km diameter
1.8	Religion?	A. Orthodox B. Protestants C. catholic D. Muslim
1.9	Parity status?	A. One child B. Two Child C. More than two children D. No child
2.0	Does she have multiple sexual partners	A. Yes B. No
2.1	HIV Serostatus	A. HIV Positive B. HIV Negative
2.2	HPV (Human Papilloma Virus) status of the patient	A. Known HPV Positive B. Known HPV Negative C. HPV status is unknown
2.3	Smoking history?	A. No smoking history B. She is a known smoker

2.4	Clinical symptoms	A. Vaginal bleeding B. Foul smelling vaginal discharge C. Pain with sexual intercourse D. More than one of these symptoms were noted
2.5	Duration of symptoms before seeking medical attention (Latency period)	A. Stayed for less than 1 month B. Stayed for one to three months C. Stayed for three to six months D. Stayed for six to twelve months E. Stayed for more than a year
2.6	Clinical staging at diagnosis	A. Stage IA B. Stage IB C. Stage IIA D. Stage IIB E. Stage IIIA F. Stage IIIB G. Stage IIIC H. Stage IVA I. Stage IVB
2.7	Histopathologic subtype?	A. SCC B. Adenocarcinoma C. Others (Adenosquamous, Undifferentiated or Neuroendocrine)
2.8	Was CT scan done as an Imaging Modality?	A. Yes B. No
2.9	Estimated largest tumor diameter on CT	A. 3 to 4 cm B. 4 to 5 cm C. 5 to 6 cm D. Greater than 6 cm E. Ill-defined mass (Estimated size in cm's)
3.0	Adjacent structural involvement as described by CT	A. Fat plane loss with bladder/rectum B. Clear invasion of bladder/rectum C. Clear invasion of parametrium/pelvic side wall D. Tumor invasion cannot be assessed

3.1	Was there hydronephrosis and type of hydronephrosis as noted on the CT.	A. No hydronephrosis B. Unilateral hydronephrosis C. Bilateral hydronephrosis
3.2	Associated Lymphadenopathy seen by the CT.	A. One Pelvic LAP B. Two pelvic LAPS C. More than two pelvic LAPS D. Retro abdominal LAP E. Distant LAPS from those mentioned above (like mediastinal LAPS)
3.3	Was there lung metastasis	A. Yes B. No
3.4	Was there bony metastasis	A. Yes B. No
3.5	Was there Liver metastasis	A. Yes B. No
3.6	What was the CT imaging stage of the disease?	A. Stage IA B. Stage IB C. Stage IIA D. Stage IIB E. Stage IIIA F. Stage IIIB G. Stage IIIC H. Stage IVA I. Stage IVB
3.7	Was there a discrepancy between clinical and CT radiologic staging?	A. Yes B. No C. Difficult to conclude
3.8	Was MRI done for the local staging	A. Yes B. No
3.9	What was the local staging by the MRI	Specify_____

4.0	Comparison of clinical local staging with the MRI local staging	A. The MRI over staged the disease compared to the clinical stage initially given B. The MRI under staged the disease compared to the clinical stage initially given C. The clinical and MRI staging were similar
4.1	Comparison of clinical staging with the CT staging	A. The CT over staged the disease compared to the clinical staging B. The CT under staged the disease compared to the clinical staging C. The clinical and CT staging were similar