The Most Common Types of Cancer Treated by Radiotherapy in Tobruk , Libya

(Original Research Article)

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Abstract: This study focuses on the treatment of various types of cancer using radiotherapy, with particular emphasis on the most common cancers observed in the Oncology Department of Tobruk Medical Centre, Libya, between 2018 and 2021. In recent years, there has been a global rise in cancer incidence. Against this backdrop, the present study aimed to identify the most prevalent cancers at Tobruk Medical Centre among patients who received both chemotherapy and radiotherapy. Over the past two decades, advances in radiotherapy, imaging technology, and chemotherapy have significantly improved cancer treatment. Radiotherapy has become a critical component in multimodal cancer care, often following chemotherapy, and plays a key role in improving patient outcomes. In this study, we aimed to highlight the impact of radiotherapy on patients treated at Tobruk Medical Centre. A total of 921 patients received chemotherapy and radiotherapy at the centre during the study period. However, only 516 patients completed their follow-up through the oncology department. These patients were diagnosed with various cancer types, including breast, nasopharyngeal, cervical, uterine, lung, brain, and colorectal cancers. Among them, breast cancer emerged as the most common diagnosis over the four-year period. Radiotherapy was found to play a significant role, particularly in early-stage breast cancer treatment. Further research is recommended to validate these findings and explore outcomes across different cancer types in the Libyan context.

Keywords: Oncology department at Medical Tobruk Cancer, Radiotherapy, Tobruk Libya.

1. Introduction

Changes in patterns of treatment and survival in patients with stage-stage lung, nasopharyngeal, cervical, and other non-small cell carcinomas with introduction of body radiotherapy (Dahele, et al., 2020). Introduction of more advanced radiotherapy techniques for locally advanced breast, nasopharyngeal and cervical cancers is associated with improved quality of life and reduced symptom burden. Radiation therapy with or without chemotherapy is often the treatment of choice for patients with breast, nasopharyngeal, lung, and advanced cervical cancer.

However, it has been associated with significant organ-at-risk (OAR) toxicity, including dry mouth, dysphagia, loss of taste, weight loss, generalized body weakness, and elevated body temperature (Shafiee & Atala 2016).

The current study investigated the hypothesis that gradual reductions in radiotherapy dose improved and reduced symptom burden Final radiation therapy is standard treatment for many patients with different non-small non-small keters.

The results of treatment have improved over the past decades. It has been proven that many effective and safe treatment systems Cancer is a well-known killer of humans worldwide, and its treatments are varied and sporadically successful. (Liu & Yang 2014).

There are four main types of cancer treatments, which are surgery, chemotherapy, radiotherapy, and immunotherapy. Radiotherapy, as a primary treatment strategy, has been proven to be an effective tool in combating with cancer (Merricket al., 2020).

Radiation therapy is a treatment procedure that uses radiation to kill malignant cells. This treatment targets rapidly reproducing cells such as those in cancer Therefore, when cancer cells are irradiated, there is a lesser effect on more slowly reproducing surrounding healthy cells (Akbari et al., 20124).

Recently, some mathematical models focusing on the treatment of cancer by radiotherapy have been presented and studied Han et al ., 2021) he focused on the dynamic behaviors of normal cells that influence cyclic radiation and establish some conditions on the permanence and extinction of normal and irradiated cells. Moreover, they obtained criteria for the existence and stability of a global convergence of the system's unique positive periodic solutions.

Belostotsky presented a mathematical model to represent the interactions between healthy and cancerous cells exposed to radiation, in which the interactions between healthy and cancerous cells were viewed as competition for bodily resources. Show four different control mechanisms for radiation delivery. They included continuous continuous radiation, continuous radiation proportional to the immediate focus of the cancer, continuous radiation proportional to the ratio of cancer to the concentration of healthy cells, and periodic radiation. He assumed that the effect of radiation on healthy cells in the ideal case is zero and got some sufficient conditions in each case to ensure the cure or treatment of the cancer [12]. Belostotsky and Friedman developed and analyzed a mathematical model of cancer treatment by radiotherapy using control theory, in which radioactivity only affected cancer cells. Later, considering the fact that radiation may also affect healthy cells to some extent during radiotherapy, Friedman and Belostotsky in extended the previous study by obfuscating previous models. They considered four types of treatment delivery: continuous, linear, feedback and cyclic, turbulent deliveries. For each case, they set some sufficient conditions for the treatment condition and treatment condition 13. only considered turbulent periodic radiation, investigated periodic radiation, it assumed that the effect of radiation on healthy cells is zero. Hence, the study of periodic radiation under conditions of influence of cancer and healthy cells by radiation is of great importance. Since radiation therapy is actually a mechanism for changing the concentrations of cancer and health cells by harvesting. Hussain (S. A., et al., 2021)

99.9% of patients undergoing BCS without chemotherapy remain compliant with the current quality measure, 25% have delays > 8 weeks to start radiation, which is associated with impaired survival. These data suggest that the current quality measure should be dichotomized into two, with or without chemotherapy, in order to impel prompt radiotherapy initiation and maximize outcomes in all patients (Bleicher et al., 2021). The GLOBOCAN 2018 statistics has estimated that across twenty world regions, there was 18.1 million new cancer cases and 9.6 million cancer deaths in 2018 (Bray et al., 2018). Lung cancer is the most frequent cancer among men, followed by prostate and colorectal cancer for incidence. Among females, breast cancer is the most commonly diagnosed cancer and the leading cause of cancer death (Sung et al., 2021). The most commonly diagnosed cancers worldwide were female breast cancer (2.26 million cases), lung (2.21) and prostate cancers (1.41); the most common causes of cancer death were lung (1.79 million deaths), liver (830000) and stomach cancers (769000) (Ferlay at el., 2021). In this

study, we collected the data of patients with cancer who received chemotherapy in Tobruk and then radiotherapy in Benghazi and returned them to complete the rest of the doses after radiotherapy and follow-up with Tobruk Medical Center.

2. Methods

We analyzed data from the Cancer Registry of Tobruk Medical Center, Department of Oncology, for 921 patients under 65 years of age with clinical stage I of several cancers including cervical, nasopharyngeal, lung and breast cancer from 2018 to 2021. Analyzes focused on patterns of chemotherapy through radiotherapy and mediated OS for patients receiving surgery, radiotherapy, or neither surgery nor radiotherapy.

Types of Cancer and Treatment

- ***Breast cancer***

4 cycles adriamycin+cyclophosphamide, 4cycles Taxotare+herceptin, then refere to radiotherapy after finish return back to take remaine cycles of Herceptin.

- **Lung Cancer**

platinum based chemotherapy (cisplatin,carboplatin,)+another type of chemotherapy.

- **Cervical Cancer**

According to the stage. After hysterectomy refer to radiotherapy which two type:-

-external beam radiotherapy

-internal brachytherapy

Some patient was need cycles of chemotherapy as cisplatin avastin 5Fu taxol.

- **Brain Cancer**

focal radiotherapy with chemotherapy may needed As carboplatin,vincristin,avastin

Temozolomide alternative with radiotherapy.

- **NPC**

Patients with early or localized disease may be treated with definitive radiation therapy to the nasopharynx and elective radiation therapy to the neck Chemotherapy and radiation for locally advanced NPC As cisplatin, carboplatin, Gemzar, Taxol.

- **Rectal Carcinoma**

Radiotherapy was added for adjuvant chemotherapy as Folfox, xeloda, AS for the types of radiotherapy that they use, there are two types:

- External beam radiotherapy

-Internal beam radiotherapy

They used two types D2 and D3.

Data Analysis

Data were analyzed using SPSS (version 23) for Windows (Graduate Pack, version 23) and Intercooled Stata (version 10 for Windows) computer programs.

3. Results And Discussion

Data were collected from 2018 to 2021 were providing at medical tobruk centre, oncology department for pateints with different types of cancer who had treated by chemotherapy and radiotherapy in Tobruk and benghazi total of patient about 516 who have followed as shown in (Table 1).

Tabe 1 Total Number of Patients with Cancer.

YEARS	BREST	BRAIN	CERVIX	LUNG	NCP	CRP
2018	97	4	3	12	7	33
2019	76	9	4	17	6	47
2020	72	2	2	19	4	35
2021	30	4	3	14	2	14
TOTAL	275	19	12	62	19	129
SEX	Female	Female & male	Female	Male	Female & male	Female &male

In last four year where was the hieghest one is the breast cancer with a total 275 cases of women in last 4 years as shown in (Figure1).

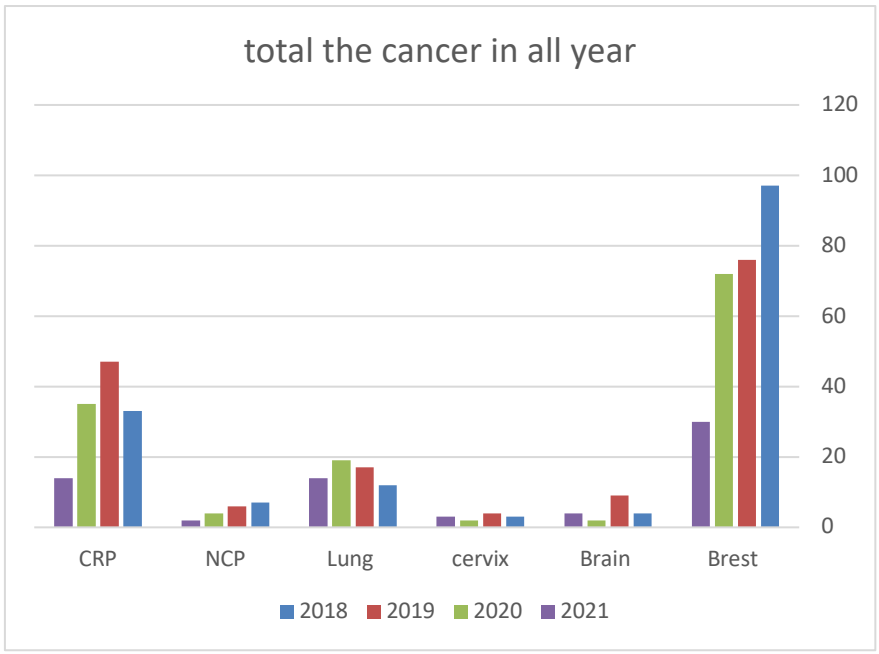
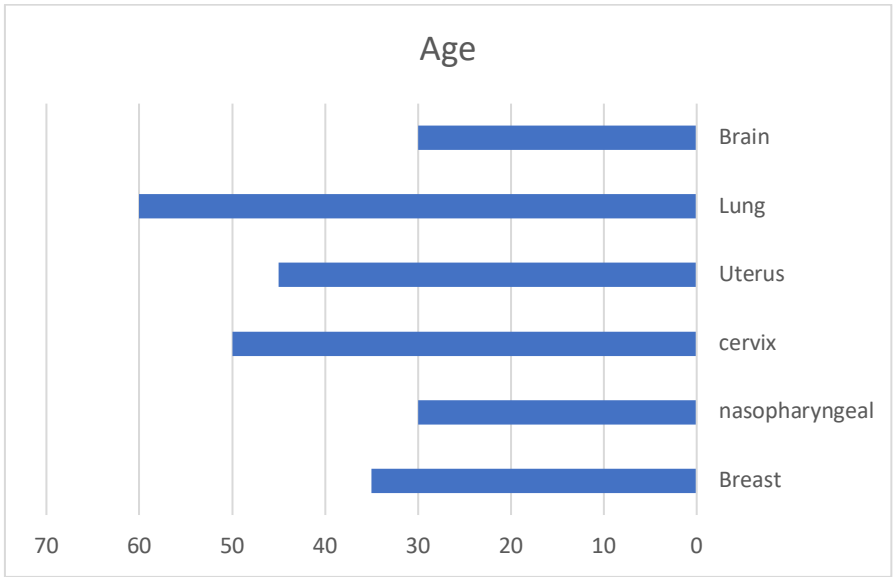


Figure 1. Types of Cancers from 2018 to 2021.

After that the colonrectal. In addition, the patients were in their thirties as in (Figure 2), and this was likely due to the unhealthy diet and the use of contraceptive drugs. They also used chemicals to a large extent compared to the past centuries, when elderly women did not use these preparations.



Figuer 2. Ratio Age to Types of Cancer.

Older men are more likely to have lung cancer, and we can suggest this to smoking, because women in Tobruk do not smoke and young men do not show the risks of smoking in the

beginning. For nasopharyngeal and brain and colorectal cancer, It is different between men and women in average age. Chemotherapy was used in Tobruk and then radiotherapy in Benghazi. The two treatments had a great role in recovery, especially breast cancer in the early stages, but with cases in the late stages and lung cancer did not give any result and it was only for pain relief or as a routine procedure. Ferlay at el., (2021) conducted stdies with The most commonly diagnosed cancers were female breast cancer, lung and prostate cancers. the most common causes of cancer death were lung ((Ferlay, J., at el ., 2021). That agrees with this paper in many points where the breast cancer was the highest rate, in addition the lung cancer in the third.

Sung et al., (2021) studies about the Lung cancer are the most frequent cancer among men, followed by prostate and colorectal cancer for incidence. Among females, breast cancer is the most commonly diagnosed cancer and the leading cause of cancer death (Sung et al ., 2021). This agree with our study: the lung cancer common in men, the colorectal cancer is the seconed after breast cancer. Conducted studies with breast cancer patients who 25% have delays > 8 weeks to start radiation, which is associated with impaired survival. (Bleicher, et al., 2021). We agree with this study, as some patients with breast cancer in the late cases did not succeed with chemotherapy and radiotherapy. Therefore, we recommend early detection to save time and save patients' lives.

Conclusion

the purpose of this study is to know the effectiveness of chemotherapy and radiotherapy for patients who suffered from cancer and who were treated in Tobruk Medical Center where chemotherapy and radiotherapy played a major role. The earlier the disease was detected, the better the response to treatment, especially in breast, colorectal and nasopharyngeal cancers, but lung cancer and late stages of breast cancer did not give any result for treatment. More studies are needed to confirm these results

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