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3 (68) 2024 : 001-004 • RESEARCH ARTICLE

The comparison of the effects of radiotherapy and/or chemotherapy in expectant pregnant women with non-small cell lung cancer

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SUMMARY

AUTHORS' CONTRIBUTION: (A) Study Design · **(B)** Data Collection . **(C)** Statistical Analysis · **(D)** Data Interpretation · **(E)** Manuscript Preparation · **(F)** Literature Search · **(G)** No Fund Collection

Introduction: While Radiation Therapy (RT) uses high-energy radiation to kill cancer cells, concurrent Chemoradiotherapy (CCRT) is the application of chemotherapy with radiation treatment. Late toxicities are long-term side effects perhaps occurring months or even years after therapy ends.

Method: Linked to CCRT and RT alone, a retrospective analysis aimed to evaluate the risk of acute and late toxicities in women With Non-Small Cell Lung Cancer (NSCLC). Among the immediate toxicity were leukopenia, hepatic and renal failure, nausea and vomiting, and neutropenia.

Results: Acute Toxicity; the CCRT group had much more occurrences of neutropenia than the RT group; rates of nausea and vomiting were also much higher in the CCRT group. Compared to acute CCRT and acute RT toxicities, both late CCRT and late RT toxicities displayed rather higher incidence of severe neutropenia, nausea and vomiting.

Conclusion: Our study shows that CCRT is more likely than radiation treatment to cause late-stage severe toxicity. Moreover, for both CCRT and RT, the significance of late toxicities especially late severe ones is stressed. These findings coincide with the given claim.

Keywords: Rectovaginal fistula; Obstetric fistula; Non-obstetric fistula

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Word count: 1357 **Tables:** 02 **Figures:** 02 **References:** 10

Received: 02.08.2024, Manuscript No. gpmp-24-144233; **Editor assigned:** 03.08.2024, PreQC No. P-144233; **Reviewed:** 15.08.2024, QC No. Q-144233; **Revised:** 29.08.2024, Manuscript No. R-144233; **Published:** 30.09.2024

INTRODUCTION

Malignant tumors occurring during pregnancy have attracted greater spotlight since their significantly higher frequency and negative effects on mother and newborn outcomes. Secondly posing a major difficulty for making decisions for treatment are the developing ethical questions. ONE Although lung cancer's incidence during pregnancy is less than that of breast cancer, cervical cancer [1]. A collection of lung tumours includes adeno-carcinoma, squamous cell carcinoma, and large-cell carcinoma is known as Non-Small Cell Lung Cancer (NSCLC). With half of all NSCLC cases linked to adenocarcinoma, this is the most often occurring form. Usually starting in the tracheobronchial tree, squamous cell carcinoma was once the most typically identified kind of cancer; but it is now more commonly discovered in the outer portions of the lung. High-energy ionizing radiation is used in Radiation Treatment (RT) to especially target and destroy cancer cells [2,3]. Combining chemotherapy and radiation treatment for a more aggressive approach to cancer treatment helps to improve therapy effectiveness. On normal tissues, this mix can, however, have major negative consequences that affect the patient's quality of life. Thus, a key component of individualized medicine is precisely forecasting and controlling these side effects either before or during the early phases of treatment [4]. Radiotherapy and CCRT can lead to variable levels of acute leukopenia, liver and kidney failure, nausea and vomiting in NSCLC patients, which might increase the risk of foetus abnormality and potentially delay treatment [5]. The goal of this study was analysed and contrast the immediate and long-term side effects of radiation treatment with Chemotherapy And Radiation Therapy (CCRT) in pregnant woman.

METHODS

A prospective study is studied the risk of acute and late toxicities of Concurrent Chemoradiotherapy (CCRT) and radiotherapy alone in woman patients of Non-Small Cell Lung Cancer (NSCLC) between January 11, 2023, to February 1, 2024, the patients were followed up from numerous government and commercial hospitals or institutions. Patients' therapy by the CCRT group includes varied dosages and durations of chemotherapy according to protocol. For patients in the radiation group, the recommended dose typically varied between 50 and 60

Gy. Each week, patients got clinical examinations, chest x-rays, and abdomen ultrasounds. In all patients, treatment failures were defined as locoregional or remote and adverse effects were examined and rated. Patients whose already on chemotherapy or radiation, they had chronic diseases or other types of cancer, and weight loss of above 20%, were excluded from the study. Included criteria for acute toxicity, such as at least one of the following: leukopenia, liver and renal failure, nausea and vomiting, neutropenia, while the neutropenia, and nausea and vomiting for late toxicity.

Statistically analytical study

Statistical Package for the Social Sciences version 26.0 (SPSS Inc.; Chicago, IL, USA) was used in all analyses for this project. GraphPad Prism 8.1 (GraphPad software, San Diego, CA) produced graphs. A one-way ANOVA test for dependent samples with multiple testing was used to evaluate variations between the RT and CCRT groups. Correcting for multiple testing for both CCRT and RT groups, pairwise comparisons between acute and late were computed with Wilcoxon pairwise test corrected for multiple testing.

RESULTS

We allocated two hundred pregnant women to radiation alone, and another two hundred received combination treatment. The group undergoing combination therapy also received three concurrent chemotherapy cycles along with radiation treatment. Patients in the radiation treatment group averaged between 30 and 45 years old; those in the CCRT group ranged in age from 25 to 45 years old. As showed in **Tab. 1.** Concurrent Chemoradiotherapy (CCRT) and radiation (RT) were evaluated and the CCRT group had notably higher frequencies of nausea and vomiting (44.3% *vs.* 14.2%), neutropenia (12.4% *vs.* 1.3%), and leukopenia (32.8% *vs.* 1.9%. In the CCRT group, the data also revealed a clear increase in the probability of acute nausea/vomiting (odds ratio [OR] =3.1, P<0.05), neutropenia (OR=9.5, P<0.05), and leukopenia (OR=17.3, P<0.05) compared to the RT group. This implies that compared to those getting RT alone, patients having CCRT are much more likely to suffer severe side effects **Tab. 1.** and **Fig. 1.**

The data shows that pregnant women in the Concurrent Chemoradiotherapy (CCRT) group experienced a significantly higher incidence of certain late toxicities compared to those in the radiotherapy (RT) group. Specifically, the CCRT group had higher rates of nausea and vomiting (44.5% *vs.* 21.6%), neutropenia (32.1% *vs.* 5.5%), and leukopenia (45.5% *vs.* 3.2%). Furthermore, the data also indicated a clear increase in the likelihood of experiencing acute nausea and vomiting (odds ratio [OR]=2.1, P<0.05), neutropenia (OR=5.85, P<0.05), and leukopenia (OR=14.2, P<0.05) in the CCRT group

Tab. 1. Shows the variations in acute toxicity rates between the two treatment modalities and explain the percentage of acute toxicity events in a sample of 200 cases, so contrasting the incidence of acute toxicity between patients who underwent Concurrent Chemoradiotherapy (CCRT) and those who underwent Radiotherapy (RT) alone.

	Treatment Group		P value	Odd Ratio
	CCRT %	RT alone %		
Acute toxicities				
Nausea and vomiting	44.3	14.2	<0.05	3.1
Neutropenia	14.4	1.3	<0.05	9.5
leukopenia	32.8	1.9	<0.05	17.3
Liver and kidney dysfunction	0.9	0	0.19	-

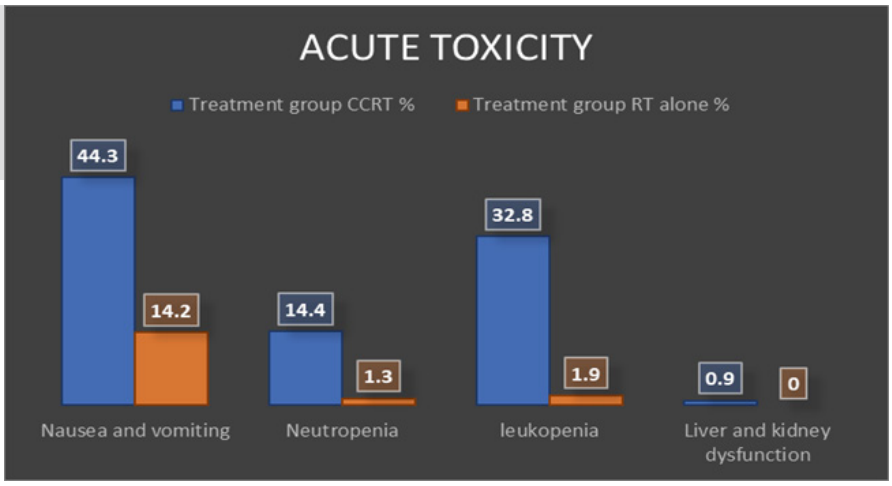
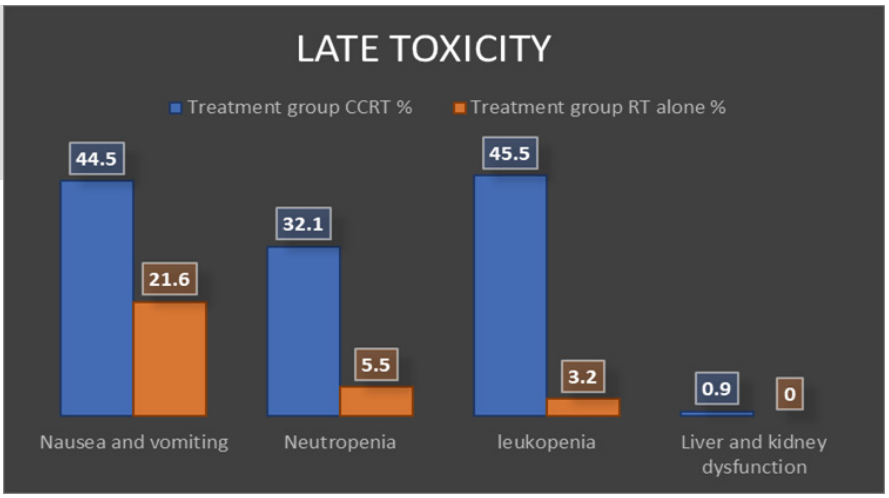


Fig. 1. The incidence of acute toxicity between patients who underwent Concurrent Chemoradiotherapy (CCRT) and those who underwent Radiotherapy (RT) alone.

Tab. 2. Compare the differences in late toxicity rates between the two treatment approaches and describe the fraction of acute toxicity events in a dataset of 200 cases. This will involve evaluating the frequency of acute toxicity in individuals who got Concurrent Chemoradiotherapy (CCRT) against those who had Radiotherapy (RT) alone.

	Treatment Group		P value	Odd Ratio
	CCRT %	RT alone %		
Late toxicities				
Nausea and vomiting	44.5	21.6	<0.05	2.1
Neutropenia	32.1	5.5	<0.05	5.85
Leukopenia	45.5	3.2	<0.05	14.2
Liver and kidney dysfunction	1.7	0.3	0.142	-

Fig. 2. The incidence of late toxicity between patients who underwent Concurrent Chemoradiotherapy (CCRT) and those who underwent Radiotherapy (RT) alone.



compared to the RT group. These findings suggest that patients undergoing concurrent chemoradiotherapy may be at a higher risk of experiencing these specific late toxicities compared to those receiving radiotherapy alone. The detailed information is presented in **Tab. 2.** and **Fig. 2.**

DISCUSSION

The findings suggest that undergoing Concurrent Chemoradiotherapy (CCRT) is associated with a greater likelihood of experiencing acute toxicities such as nausea/vomiting, leukopenia, and neutropenia when compared to receiving radiotherapy alone. Several factors have been observed to be closely linked to the side effects caused by radiation therapy, including the accumulated dose, radioactive source, target volume, dose intensity, and the occurrence of xerostomia. Furthermore, the repeated use of cytotoxic agents in chemotherapy can result in damage to endothelial tissues, connective tissue epithelium, and bone marrow [5,6].

As a result, it appears that concurrent chemoradiotherapy (CCRT) is connected to a higher risk of Gastrointestinal Tract (GIT) and bone marrow damage compared to radiotherapy alone. In clinical practice, an anti-neoplastic drug is typically administered one week after the commencement of radiotherapy.

The specific comparison of side effects between acute and late radiation therapy (RT) toxicities is not addressed in the provided search results. It is important to note that the incidence and severity of side effects can vary depending on the individual patient, the specific treatment regimen, and other clinical factors [7,8]. Acute side effects of RT typically occur during or immediately after treatment and may include skin irritation, fatigue, and nausea. Late side effects, on the other hand, may develop months or even years after treatment and can include issues such as fibrosis, lymphedema, and secondary malignancies. It's essential for healthcare providers to carefully monitor and manage these potential side effects to ensure the best possible outcomes for patients undergoing RT [9,10].

CONCLUSION

The main goal of the present work is to evaluate and contrast in pregnant patients the acute and late effects of radiation treatment alone against CCRT. The findings show that CCRT causes late severe toxicity more likely than radiation therapy. For both CCRT and RT, late toxicities are therefore more important than acute ones.

FUNDING

This study did not receive any funding.

ETHICAL CLEARANCE

The Ethical Committee of the Karbala Health Directorate has approved a protocol for a research project

with 2-8-2023. Furthermore, the patients expressed verbal assent prior to the sampling. During sampling, health safety was under focus. This study followed Iraqi Ministry of Health Ethics Committee guidelines and conformed with all national policies.

CONFLICT OF INTEREST

The authors declared there is no conflict of interest.

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