Original Article

Radiotherapy Induced Adverse Effects in Cancer Patients at Cancer Hospital Jamshoro, Sindh

Radiotherapy Effects in Cancer Patients

Tooba Khan[1], Arshad Lodhi[2], Muhammad Ali Ghoto[1], Abdullah Dayo[1], Fouzia Panhwar[3], Mudassar Iqbal Arain[1] and Ahsan Ali[1]

ABSTRACT

Objective: The objectives of the study are to analyze adverse effects of radiotherapy on blood complete picture of patient after radiotherapy and to assess number of other potential adverse effects of radiotherapy on the basis of WHO guidelines.

Study Design: Observational study.

Materials and Methods: Data was collected from patients and diagnostic record files of the patients on a predesigned questionnaire over a period of six months in 2015. Total number of 120 patients was selected via random sampling from Cancer hospital Jamshoro. Data was evaluated and analyzed according to WHO guidelines.

Results: Out of 120 patients 72 were male and 48 were female. After receiving radiotherapy 30% of the patients were having anemia, 42.5% leucopenia, 37.5% lymphocytopenia, 55% thrombocytopenia, 20.8% neutropenia. Other adverse effects were with the frequency of 86.66% of the patients had insomnia, 20% nausea/ vomiting and 26% Acidity, 13.3% abdominal pain, 20% diarrhea, 80% oral mucositis, tachycardia 46.6%, bradycardia 6.66%, amnesia 13.33%, fatigue 93.33%, vision problems33.33%, hearing problem 20%, tinnitus 26.66%, hair loss 46.66%, skin reaction 40%, 73.33% of the patients were feeling Numbness and 46.6% with loss of appetite.

Conclusion: Findings of the study concludes radiotherapy for cancer lead to various adverse Effects and these may prove fatal, if not treated early such as various effects including blood disorders which may weaken the patient's immunity

Key Words: Cancer, Radiotherapy, adverse effects

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INTRODUCTION

The highly potent and very fatal disease, Cancer, is caused by mainly the environmental. Factors that mutates gene codings of critical cells-regulatory. proteins. As a result aberrant . cell .behavior .leads to uncontrolled.growth.and.spread.of.abnormal.cells.of.the .body[1]. In all living organisms cell is the basic unit of life. Cell division occurs to form tissue increasing the body mass. When unwanted growth of cell occurs it forms increased abnormal mass of the tissue. This pathological disturbance of growth, characterized by excessive and unnecessary proliferation of cells is called Tumor. In all kinds of tissues, tumor can be formed.

[1.] Department of Pharmacy, University of Sindh, Jamshoro, Pakistan.

[2.] Department of Ophthalmology / Pharmacy[3], Liaquat University of Medical Health Sciences Jamshoro.

Correspondence: Tooba Khan, Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Sindh, Jamshoro, Pakistan
Contact No: 0945-2606164
Email: sciencepk62@gmail.com

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There are only two kinds of tumor Benign and Malignant[2]. Benign tumors mostly occur as non-cancerous. Usually, benign tumors are removable and they may grow back seldom. They are Non-invasive and remain localized. The growth rate of benign tumors is slow and might stop or regress. Benign tumors are not usually life threatening[3]. Malignant tumors are the cancerous cells. These cancers cells pervade and deteriorate the organs and tissues subsided by the tumor. They have an ability to escape from the malignant tumor and may either enter the lymphatic system or into the bloodstream. Rapid and uncontrollable growth are the characteristic features of malignant tumor cells. When there is spread of such cancer cells within the body to the other organs through the lymphatic system or the blood stream is known as Metastasis[3]. World Health Organization describes Cancer as a leading cause of death, accounted as 7.4 million deaths worldwide. The treatment for cancer depends upon its type, location and state of advancement[4]. There are three accepted conventional and standard cancer treatments: Surgery, Chemotherapy and Radiation therapy. The first treatment to remove solid tumors is Surgery, often required for early stage cancers and benign tumors in which abnormal growth

of cells or mass is removed by incision of localized tumors[5]. The treatment which involves the use of drugs and medicines to kill cancer cells is called Chemotherapy. It is often given individually, when it is given along with other therapies such as surgery and radiotherapy, it is known as neo adjuvant chemotherapy [4].In radiation therapy, radiations kill the cancer cells by directly targeting the tumor with high-energy rays. These radiations damage Deoxyribonucleic Acid and prevents the replication of the cells. Hence it preferably kills the cancerous cells that also may kills normal cells, especially those cells that are dividing. Surgery can often be used together with radiation therapy[1,5]. Pharmaceuticals drugs. That contain radioactive materials called Radioisotopes or Radiopharmaceuticals that are taken either from mouth or they are placed inside body cavity to treat cancer. Radiations are defined as the energy emitted from one place to another. These energies can either be in the form of particles called Photons or in the form of waves like X-rays or visible light. Radiations are classified according to the extent of energy emitted to break the chemical bond and knock electrons out of the atom [6].Evidence based estimations for cancer treatment indicates 52.7% to 60% of cancer patients receive radiotherapy[7]. Radiations that are used for cancer treatment are known as Ionizing Radiation as they form Ions. These ions are electrically charged particles which passes through tissues into the cells. They either kill the cancer cells or stop their growth by changing their genes. Ionizing radiation are of two kinds, Particle radiation and Photon radiation. Particle radiation includes beta particles, carbon ions, protons, electrons, neutrons and alpha particles whereas Photon radiation are x-rays and gamma rays. Ionizing energy of one type may possess more energy than the other one. Greater the intensity of the energy, more deep penetration of the radiations occur into the tissues [8,9]. Radiotherapy can either be External Beam Radiotherapy or Internal beams Radiotherapy. In External Beam radiation therapy the cancer cells are aimed by a machine outside the body. In Internals beam radiation therapy the cancer cells are treated by the radiations that are either kept inside the body or near to that cancerous cell. Internal Radiotherapy is also named as Brachytherapy[10]. External Radiotherapy, according to its function, is further divided into three types: Intensity modulated radiotherapy (IMRT), No-exit Dose Proton Beam Therapy and Stereotactic Radio surgery (SRS)[8]. Adverse effects of radiotherapy is difficult to predict exactly, it simply depends upon the treatment type and the body area under treatment [9]. The stated adverse effects usually observed are skin reactions, Hair loss, Changes in the blood, Tiredness, eating and drinking problems, sickness and Dermatitis. Depending upon the size, dose and depth of penetration of emitted energy, radiation therapy often causes dermatitis. Radiotherapy also alleviate Hemoptysis in 60 to 70% of cancer patients [7]. Radiotherapy also damages the cells that are normal and healthy like those in the salivary glands, moist and soft mouth linings, that may result in xerostomia and tooth decay[10,11]. Anemia, lymphedema, infertility are also the side effects of radiation therapy. Almost 87% of the cancer patients that are under Radiotherapy and also receiving chemotherapy developed ADRs [12].

MATERIALS AND METHODS

A prospective observational study was conducted by collecting patient's data and diagnostic record file on a predesigned questionnaire of over a period of six months. Initially, a total number of 120 patients were enrolled via purposive sampling from Cancer hospital Jamshoro. Numbers of adverse effects reported by diagnostic lab reports were assessed and data will be compared against WHO Guidelines, Cancer Treatment Centers of America and Radiotherapy Risk Profile Technical Manual.

Inclusion Criteria: All patients receiving Radiotherapy and patients on chemotherapy along with Radiotherapy were included regardless of gender.

Exclusion Criteria: Patients with HIV, Hepatitis and Tuberculosis and pregnant ladies were excluded from the study.

RESULTS

Demographics Analysis: Among 120 patients, the majority of patients were female that is 68 (56.66%) and 52 (43.44%) male as mentioned in table 1, had suffered from adverse effects after receiving the cancer radiotherapy. Further classification based on the age revealed that maximum number of affected patients were belonging to the age group of 41-50 years as shown in table no: 2.

Table No. 1: Number of patients

Gender	Number of Patients	Percentage %
Male	52	43.33 %
Female	68	56.66 %
Total	**120**	**100 %**

Table No. 2: Age groups

Age	Frequency	Percentage %
18-30 years	11	9.1%
31-40 years	22	18.33%
41-50 years	44	36.66%
51-60 years	25	20.83%
61-70 years	18	15.08%s
TOTAL	**120**	**100 %**

Adverse Effects Analysis: The study sample comprised of 120 patients, in which 36 patients making 30% of the total, after receiving radiotherapy suffered

from Anemia, 20.8% of the patients had Neutropenia, 42.5% Leukopenia and 55% were having Thrombocytopenia as shown in Table: 3.

Table No.3: Effects on blood reports after radiotherapy

Adverse Effects	Frequency	Percentage%
Anemia	36	30%
Thrombocytopenia	66	55%
Leukopenia	51	42.5%
Neutropenia	25	20.8%
Lymphocytopenia	45	37.5%

Table No.4: Other Adverse Effects

S.No	Adverse Effects	Percentage
1.	Vomiting	20%
2.	Acidity	26%
3.	Loss of Appetite	46.60%
4.	Abdominal pain	13.30%
5.	Diarrhea	20%
6.	Oral mucositis	80%
7.	Tachycardia	46.60%
8.	Bradycardia	6.66%
9.	Amnesia	13.33%
10.	Fatigue	93.30%
11.	Insomnia	86.66%
12.	Vision Problem	33.33%
13.	Hearing problem	20%
14.	Tinnitus	26.66%
15.	Numbness	73.30%
16.	Hair loss	46.66%
17.	Skin reactions	40%

In other adverse effects 80% of patients were suffering from oral mucositis. 86.66% of the patients were facing insomnia after having radiotherapy. 73.33% of the patients were feeling Numbness after having radiotherapy.

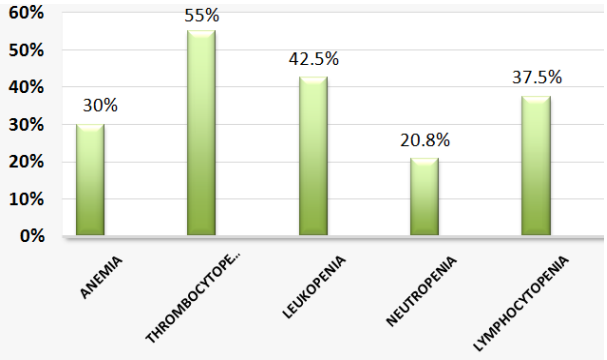
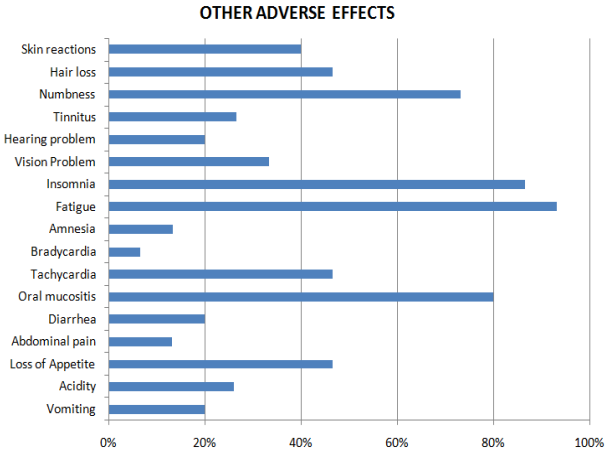


Figure No.1: Effects found on blood reports after radiotherapy

During treatment of different types of cancer with radiotherapy, the other potential adverse effects observed were concluding that 20% of the patients experienced vomiting, 26% of the patients had acidity, 46.60% of the patients were feeling loss of appetite, 13.30% of patients declared to have abdominal pain, 20% of the patients had Diarrhea. 80% of the patients had oral mucositis, 46.60% of the patients had Tachycardia, 6.66% of the patients had bradycardia, 13.33% of the patients had Amnesia, 93.30% of the patients were experiencing fatigue, 86.66% insomnia, 33.33% vision problem, 20% of the patients had Hearing problem, 26.66% of the patients had Tinnitus, 46.66% of the patients had Hair loss, 40% of the patients had skin reactions, 73.30% of the patients were feeling Numbness after receiving the required dose of their radiotherapy as given in table 4.



Graph No.1: Graphical Representation of Other Adverse Effects

DISCUSSION

In our study females were accounted to more than half of the cases. During the study, it was observed that the populations in the age group 41-50 years were more prone to the development of adverse effects after receiving radiotherapy. Numbers of adverse effects were found in blood reports of the patients. Commonly the patients were experiencing thrombocytopenia. After receiving radiotherapy 30% of Patients suffered from Anemia, 20.8% Neutropenia, 42.5% Leukopenia and 55% were having Thrombocytopenia. In other adverse effects 80% of patients were suffering from oral mucositis. 86.66% of the patients were facing insomnia after having radiotherapy. 73.33% of the patients were feeling Numbness after having radiotherapy.

CONCLUSION

Findings of study shows that Radiotherapy for cancer lead to various Adverse Effects and those proved to be fatal when not treated early such as various effects including blood disorders which weaken the patient's immunity. In noticeable number of patients different therapies were provided to prevent those adverse effects and to cure patient's health and quality of their life.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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