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Cancer Pattern at a Tertiary Care hospital in Pir Panjal (Rajouri & Poonch) region of Jammu and Kashmir

Abdul Hakim[1], Aman Sharma[2], Rohini Sharma[3], Shazia Qayoom[4]

[1] Associate Professor, Department of Radiation Oncology, Government Medical College, Rajouri, Jammu & Kashmir 185131.
[2] Associate Professor, Department of Pharmacology, Government Medical College, Rajouri, Jammu & Kashmir 185131.
[3] Associate Professor, Department of Dermatology, Government Medical College, Rajouri, Jammu & Kashmir 185131.
[4] Assistant Professor, Department of Ophthalmology, Government Medical College, Rajouri, Jammu & Kashmir 185131.

Corresponding Author:

Aman Sharma
Associate Professor, Department of Pharmacology, Government Medical College, Rajouri, Jammu & Kashmir 185131.

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ABSTRACT

Background: Cancer is a leading cause of death worldwide with incidence of 20 million and expected to increase to 32.6 million by 2045. The present study intends to study the cancer patterns in Rajouri and Poonch districts in a tertiary care hospital.

Material and Methods: This is a retrospective study of all patients registered in our tertiary care hospital under department of Radiation Oncology, GMC Rajouri from January 2019 to October 2025. This study has been conducted to assess the pattern of cancer in our region.

Results: In this retrospective study, a total of 495 patients were registered in department of Radiation Oncology. Of all the patients registered, 239 patients (48.2%) were male and 256 patients (51.7%) were female. 389 (78.5%) patients were from District Rajouri, 99 (20%) from District Poonch and 07 (1.5%) from other districts. Majority of the patients (271, 54.7%) belonged to age group <60 yrs, 169 patients (34.1%) were above 60 yrs and less than 75 yrs, 55 patients (11.1%) were above 75 yrs of age. Regarding site of cancer, Gastrointestinal cancers were most common. Individually lung cancer was most common in males followed by prostate cancer, esophageal cancer and lymphoma. In females, breast cancer was most common followed by ovarian cancer, gall bladder/cholangiocarcinoma, gastric cancer and cervix uteri cancers respectively. At the time of presentation most of patients were in advanced stage; 157 patients (31.7%) in stage III and 180 patients (36.3%) in stage IV. Regarding treatment modality, 256 patients (52%) received chemotherapy, 171 patients (34.5%) received radiation therapy and 130 (27%) received surgery.

Conclusion: Majority of patients had gastrointestinal cancers. Lung cancer was most common in men and breast cancer in women. Majority of patients presented in late stage (III & IV).

Keywords: *Cancer burden, Epidemiology, GI Cancer, Lung Cancer, Breast Cancer, Rajouri, Poonch.*

INTRODUCTION

Cancer is a group of disorders which are all brought about by uncontrolled growth and proliferation of abnormal cells. These cells are capable of infecting the surrounding tissues and diffusing to other body organs via the lymphatic and blood systems. Unregulated cellular activity distinguishes malignant neoplasms with benign growths, and cancer is one of the most difficult and fatal health issues that humans are exposed to nowadays. Over the few past decades, cancer has emerged as one of the leading causes of death and morbidity at the global level and this has become a massive burden on healthcare, the economy and society in general. The complexity of its etiology, which includes genetic, environmental, and lifestyle factors, points at the need to conduct large-scale epidemiological studies to clarify the differences in incidence, risk, and outcome between regions. The impact of cancer is becoming increasingly bad everywhere in the

world.[1,2] According to the World Health Organization (WHO), cancer is currently the second largest cause of death in the world as around ten million people die each year or nearly one in every six to die. This has been indicated by the Global Cancer Observatory (GCO) that reported about 20 million new cancer incidences in the world in 2022. This figure is likely to increase to 32.6 million by 2045. This frightening increase can be explained by the fact that more people live longer, migrate to urban areas and develop such bad habits as smoking, lack of appropriate physical activities, bad diets, and excessive consumption of alcohol. Survival is better in high-income nations due to the superior screening, diagnosing and treatment. Nevertheless, in low- and middle-income countries (LMICs), the mortality rate caused by cancer remains higher due to late diagnostics, lack of sufficient healthcare facilities, and the insufficient access to treatment. Cancer is not spread evenly across geographies and socioeconomic lines all over the world.[3,4]

About half of the most common include lung, breast, prostate, and colon cancers in the wealthy countries. On the contrary, in poorer countries, cancers, which are caused by infections, like liver, cervical, and stomach cancers, are the most widespread. The world has lung cancer as the number one cause of cancer deaths, followed by colorectal, liver, stomach, and breast. Although there has been a considerable improvement in medical and general health research, the disparity between cancer cases and deaths remains very high in the developing regions. This is due to the issues of access to healthcare, awareness, and allocation of resources. India is undergoing a drastic shift in its epidemiology with a population of over 1.4 billion and is growing rapidly.[5] This is because diseases that are not communicable like cancer are on the rise and are currently the leading cause of death as compared to the infectious diseases. According to the Indian Council of Medical Research-National Cancer Registry Programme (ICMR-NCRP) an estimated 1.4 million new cancer cases were reported in India in 2022. The number can reach approximately 2 million by 2040. China and the United States lead in the world in terms of cancer with India coming in third. However, there is a high level of variation in the cancer profile of a particular area to another in the country with huge differences in the type and prevalence of cancer.[6,7] In India, the most common cancer cases that are diagnosed to men include lung, oral cavity, esophageal, stomach and colorectal. In women the most common ones are breast, cervix uteri, ovary, gallbladder and thyroid. These differences can be mostly attributed to variations in genetics, diet, lifestyle, and access to healthcare in various locations. Smoked or smokeless tobacco use remains the most glaring preventable risk factor with some estimates showing that it contributes to approximately one-third of all cancer incidence in the country. Other significant reasons are alcohol consumption, exposure to environmental carcinogens, inadequate nutrition, obesity, and infections such as human papillomavirus (HPV) and hepatitis B and C viruses in addition to smoke.[8] The rising urbanization and lifestyle changes in India have led to rise in cancers which are attributed to obesity, hormone related and dependent, such as breast, colorectal and endometrial cancer.[9]

The epidemiology of the Union Territory of Jammu and Kashmir is a very curious one in India. The geography, weather, eating habits, and cultural practices in the region have resulted in the region having a different cancer rate as the rest of the country. Past hospital based cancer registries within the tertiary hospitals such as Sher-i-Kashmir Institute of Medical Sciences (SKIMS) in Srinagar and Government Medical College in Jammu have demonstrated that there are great differences between regions. The most common cancer that has been reported in the Kashmir Valley is gastrointestinal cancer in the form of gastric, colorectal and esophageal cancers. This trend has been linked to specific lifestyle and nutritional habits such as the habitual intake of salty tea (noon chai), pickles, smoked meat, low intakes of fruits and exposure to nitrosamines and other potential carcinogens. On the other hand, in Jammu region, statistics show more head and neck malignancies, breast cancer and cervical carcinoma and tend to show more patterns related to those in the northern part of India. Despite these revelations, no available data is sufficient in the Pir Panjal region, which comprises of the districts of Rajori and Poonch. This is primarily rural and mountainous and is situated between the Jammu plains and the Kashmir Valley. It does not possess a great number of special oncology services. The nearest tertiary care facilities were not available in this area and that is why most patients were forced to travel far to Jammu or Srinagar to be diagnosed and treated. This tended to imply that they would report late and be in serious stages of the disease by the time they are diagnosed. The Department of Radiation Oncology was created in Government Medical College (GMC), Rajouri in 2019, which has helped to investigate the trends of cancer among this underserved population.

The aim of the study was to observe the pattern, distribution, and characteristics of cancers among patients admitted to the department of radiation oncology, GMC Rajouri in the period starting January 2019 to October 2025. This post-facto study attempts to establish the types of cancer that are most prevalent, their age and sex distribution, stage of diagnosis, and the type of treatment that is most widely used. This type of information proves essential in comprehending the epidemiology of cancer in various regions throughout the world, particularly those communities that are remote and have low incomes. Although limited in their population coverage, hospital-based cancer data can give ample information about the trends in diseases, health-seeking practices, and gaps in healthcare access. As far as the entire population in the Pir Panjal does not have a cancer registry, these are just starting studies that will help determine the spread of the disease, the risk factors of the population, and how future cancer can be most effectively controlled. Moreover, the understanding of the cancer profile in the region can help the policy makers in resource allocation, infrastructure development and development of local community based awareness and screening programs that are more attuned to the local needs. The findings of the project are expected to enhance the understanding of the cancer burden in the Pir Panjal region, identify

the opportunities to diagnose and prevent cancer at its initial stages, and support the argument of developing population-based cancer registry in this area of Jammu and Kashmir.

MATERIAL AND METHODS

Study Design and Setting

This retrospective, observational study was conducted in the Department of Radiation Oncology, Government Medical College (GMC), Rajouri, which serves as a tertiary care referral center for the Pir Panjal region of Jammu and Kashmir, encompassing the districts of Rajouri and Poonch. The institution caters to a predominantly rural population with limited oncology infrastructure, making it a representative site for assessing regional cancer trends.

Study Period and Population

The study included all newly diagnosed cancer patients registered in the department between January 2019 and October 2025. Both male and female patients across all age groups and cancer types were included. Patients with benign tumors, incomplete records, or uncertain diagnoses were excluded from analysis.

Data Collection

Patient information was obtained from departmental medical records, case files, and electronic databases. The following variables were extracted:

- **Demographic details:** Age, Sex, Place of residence (rural/urban), and District of origin.
- **Clinical characteristics:** Primary tumor site, Histological type (where available), and Stage at presentation.
- **Lifestyle and addiction history:** Tobacco use, Smoking, and Alcohol consumption.
- **Associated comorbidities:** Including Hypertension, Diabetes mellitus, and Tuberculosis.
- **Treatment details:** Modalities such as surgery, Chemotherapy, Radiotherapy, or Best supportive care.

All data were verified by cross-checking physical and electronic patient records to eliminate duplication and ensure completeness.

Cancer Site Classification

Malignancies were categorized according to the primary anatomical site following the International Classification of Diseases for Oncology, Third Edition (ICD-O-3). The principal cancer groups analyzed included:

- Gastrointestinal cancers
- Respiratory system cancers (including lung and bronchus)
- Genitourinary malignancies (prostate, bladder, and ovarian)
- Breast cancers
- Head and neck cancers
- Lymphoid and hematopoietic malignancies
- Others (rare or unspecified sites)

Staging of Disease

Cancer staging was determined based on available clinical, radiological, and pathological findings, using the American Joint Committee on Cancer (AJCC) staging system. Patients were classified into Stages I–IV; cases lacking sufficient data were designated as "stage not known."

Treatment Modalities

Treatment categories included:

- **Surgery** – Curative or palliative intent.
- **Radiation therapy** – External beam radiotherapy (definitive, adjuvant, or palliative).
- **Chemotherapy or systemic therapy** – Including cytotoxic chemotherapy, hormonal, or targeted therapies.
- **Best supportive care** – For patients not eligible for definitive treatment.

Each patient's primary treatment approach was recorded to evaluate therapeutic distribution within the study cohort.

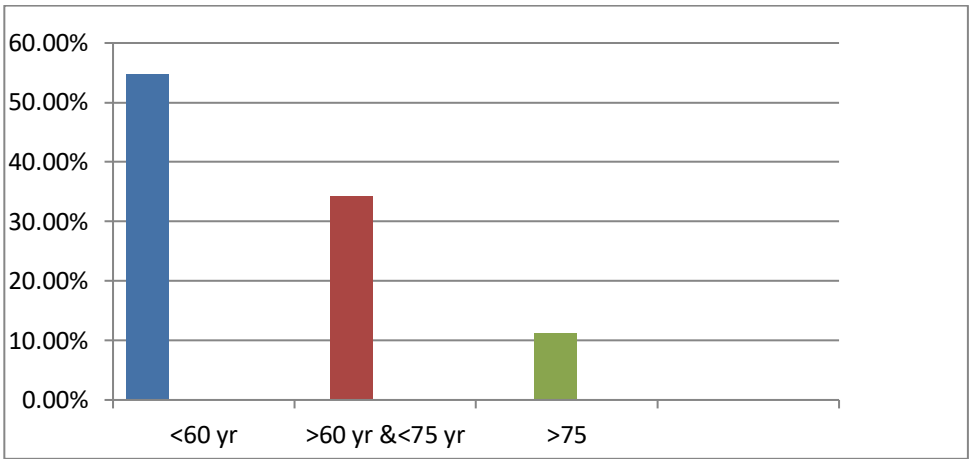
Statistical Analysis

Data were compiled and analyzed using Microsoft Excel 2021 and SPSS version 26.0 (IBM Corp., USA). Descriptive statistics, including frequencies and percentages, were applied to summarize categorical variables. Continuous variables were expressed as mean ± standard deviation where applicable. The findings were presented through tables, charts, and graphs to depict trends in demographic patterns, cancer sites, stages, addictions, comorbidities, and treatment modalities.

RESULTS

From the year January 2019 to October 2025, a total of 495 new patients were registered. Out of these 48.2% were males and 51.7% were females. Majority of the patients were from rural background (87.2%) and only 12.8% belonged to urban areas.

Age distributions of patients were as follows:
Majority of the patients were aged less than 60 years (54.7%), 34.1% were between 60 and 75 years and 11.1% were aged more than 75 years. (Bar Chart 1)



Bar Chart 1: Age distributions of patients.

Cancer by Site:
It was observed that gastrointestinal were most common in our region. In males lung cancer was the most common cancer followed by prostate cancer, esophageal cancer, gastric cancer and lymphomas.
Breast cancer was the most common cancer in women followed by ovarian cancer, gall bladder/cholangiocarcinoma, gastric cancer and cervical cancers. The findings are presented in **Table 1.**

Table 1: Cancer observed by site

Cancer Types	No. of cases	%age
Head and neck	47	9.4%
Oral Cavity	9	1.81%
Oropharynx	9	1.81%
Larynx/Hypo	12	2.42%
Nasolarynx	5	1.01%
Brain	12	2.42%
Lung	55	11.1%(Males 32,Females 23)
Non small cell ca lung	45	9.09%
Small cell ca	10	2.02%
Breast Cancer	58	11.7%
Gynecological Cancer	45	9%
Ca cervix	10	2.02%
Ovarian Cancer	29	5.85%
Endometrial Cancer	6	1.21%
Gastrointestinal Cancer	112	22.62%
Esophageal Cancer	27	5.45% Male- 20, Female-7
Gastric Cancer	25	5.05% Male-13, Female-12
Colon Cancer	13	2.62%
Rectal Cancer	08	1.61%
Ca Anal Canal	02	0.405
Ca Gall Bladder/ Cholangiocarcinoma	25	5.45% Male-09, Female- 16
Pancreatic Cancer	12	2.42%
Urinary Bladder Cancer	22	4.44%
Prostate Cancer	25	5.45%
Lymphomas	45	9%
Hodgkin's disease	14	2.82%
Non Hodgkin's	31	6.26%
Lymphoma	32	6.46%
Leukaemias	22	4.44%
Others	39	7.89%

Stage of disease at presentation:
Most patients in our region had advanced stage of the disease at the time of presentation. It was observed that 68% of patients were in advanced stage of disease (31.7% had stage III cancer while 36.3% had stage IV) (Table 2).

Table 2: Stage of disease at presentation

Stage	No. of patients	%age
I	**09**	**2%**
II	**52**	**10.5%**
III	**157**	**31.5%**
IV	**180**	**36.3%**
Not known	**22**	**4%**

Addiction:
18% of patients had history of smoking, 10% were tobacco chewer and 3.2% had history of alcohol intake. (Table 3).

Table 3: Known Addiction

Addiction	No. of patients	%age
Smoking	**89**	**18%**
Tobacco Chewing	**49**	**10%**
Alcohol	**16**	**3.2%**

Associated co-morbidity:
14% of patients had hypertension, 5% had type II diabetes mellitus & 8% had history of tuberculosis (Table 4).

Table 4: Associated Co-morbidity

Co-morbidity	No. of patients	%age
Hypertension	68	14%
Diabetes Mellitus	25	5%
Tuberculosis	9	1.8%

Treatment modality
Among patients registered in our setup since January 2019 till October 2025, 27% of patients underwent surgery, 34.5% received radiation therapy curative/palliative and 52% of patients received systemic therapy and induction chemotherapy, hormonal therapy or targeted therapy. Approximately 10% of patients received only best supportive care (Table 5).

Table 5: Treatment modality

Modality	NO. of Patient	%age
Surgery	130	27%
Chemotherapy/HT	256	52%
Radiation therapy	171	34.5%
Best supportive only	45	10%

DISCUSSION

Cancer is currently one of the largest health issue in the globe. According to the GLOBOCAN 2022 estimates, nearly 20 million new cancer cases and more than 9.7 million cancer deaths occurred throughout the world. Increase in new cases is bound to increase by 35 million by 2050 and this is a massive growth that can be attributed to population aging, change of lifestyle and environmental conditions. The most common types of cancer in the world are lung, breast, colorectal, stomach and prostate cancers. They constitute nearly fifty percent of the cases.[10, 11] Most cancer deaths happen in Asia, where access to healthcare and early detection are still limited. Tobacco use, being overweight or obese, eating poorly, and getting infections are some of the most prevalent preventable risk factors that yet add a lot to the overall burden of disease.[12]

The findings of this paper provide valuable data regarding the cancer burden and its transmission in Pir Panjal area of Jammu and Kashmir. Indian cancer epidemiology in this region has not been well examined. Our data reveal that the most common cancers in this community are the gastrointestinal malignancies followed by the breast and lung cancers which present themselves late and have limited access to radiations facilities. These observations are reflective of the local demographic and lifestyle setting as well as consistent with epidemiological trends that have been reported in the Kashmir Valley and parts of northern India in general.

Our study results align with worldwide and Indian data, highlighting the increasing incidence of cancer and the ongoing challenge of late-stage presentation as a significant barrier to enhanced outcomes. According to the Global Cancer Observatory (GCO 2022), India had 1.4 million new cancer diagnoses, 0.9 million deaths, and 3.2 million cases that were still active five years after diagnosis.[13, 14] The most common malignancies in Indian males are lip and oral cavity, lung, esophagus, colorectum, and stomach. In women, breast, cervix uteri, ovary, oral cavity, and colorectum are the most common. These national numbers reveal that India has two types of cancer: cancers caused by infections, such as cervix and liver cancer, and cancers caused by lifestyle choices, like tobacco use, obesity, and diet.[15, 16] The pattern shown in Jammu and Kashmir, on the other hand, is very different from the national average. Prior research conducted in the Kashmir Valley has consistently identified gastrointestinal cancers—specifically gastric, colorectal, and esophageal malignancies—as the most prevalent types. Research conducted by Qayoom *et al.* (2020), Rasool *et al.* (2012), and Khan *et al.* (2021) has reported a significant prevalence of stomach cancer in the region, associated with particular environmental and lifestyle determinants.[13, 17, 18] The prevalent consumption of salted tea, pickled foods, smoked meats, and nitrosamine-rich meals, alongside insufficient fruit and vegetable intake, has been suggested as a significant factor contributing to this trend. Moreover, socioeconomic difficulties, insufficient early screening, and restricted healthcare access aggravate the situation, leading to late-stage diagnosis.

These observations are supported by our findings. In the present research, gastrointestinal malignancies were the most common type of cancer between both sexes combined. Most frequent in males were lung, esophageal, prostate, and gastric. Among the females, the most prevalent were breast cancers, then ovarian, gallbladder/cholangiocarcinoma and gastrointestinal cancers. This tendency is similar to the ones obtained in previous studies in the Kashmir Valley that validate the assumption that Pir Panjal and the surrounding areas share similar disease patterns. Our group has very different low rates of oral cavity and cervical cancers compared to the national average. This could be attributed to local sociocultural factors like women chewing less tobacco and having conservative sexual behaviors which reduce their chances of being exposed to HPV. The other critical outcome is that the diagnosis was late. The patients studied in this study were found to have more than 68% with Stage III and Stage IV disease indicating that there was a general delay in the diagnosis. This finding is consistent with the previous findings in rural India, where barriers to early detection include low level of public awareness and ignorance, poor healthcare institutions and financial constraints. Pir Panjal is also not close to any other areas and its topography is quite unfriendly, which further complicates the access of diagnostic and treatment centers in time. The consequences of late diagnosis can be observed in the survival differences, as patients who are diagnosed later have significantly worse prognosis and higher treatment costs.

The lifestyle-related risk factors have remained a significant cancer cause in the region. In our patient sample 18% smoked, 10% smokeless tobacco and 3.2% alcohol. These are comparable to other studies conducted in northern India and demonstrate why targeted tobacco control and behavior change interventions are important. The comparatively low alcohol consumption in this community can be explained by the cultural and religious beliefs that do not support alcohol consumption and could be the key to the lower rate of certain alcohol-related malignancies.[3-5]

The number of treatment modalities distributed in our study is also a reflection of the limitations of the region systemically. Fifty-two percent of all the patients received chemotherapy, 34.5% radiotherapy and 27% surgery. There were patients who received multiple types of treatment. Approximately, 10 percent of the patients received only the best supportive treatment due to the late stage of their sickness or due to their inability to afford it. The Pir Panjal area does not have functional radiotherapy units and that is why radiotherapy is not administered as recommended in the national guidelines. According to the National Cancer Registry Programme, the maximum best utilization of radiotherapy in India is over 58% yet the national average is approximately at 28.5. The question of a lack of radiation infrastructure limits the local treatment options and leads to the export of patients seeking treatment elsewhere, such as Jammu or Srinagar.[17-18] There are a number of significant implications of the findings of this study. First, they emphasize the relevance of establishing a population-based cancer registry (PBCR) in the Pir Panjal region in order to have the correct data on cancer rates and survival rates in the region. Registries located in the hospital, though of some value, often do not accurately mirror the real community burden, especially in rural areas where healthcare seeking behaviour is low. Secondly, community awareness programs should be urgently conducted to educate the people on how to detect common cancers such as breast, lung, and gastro intestinal cancers at an early stage. Such basic measures as clinical breast exams, programs that allow people to quit smoking, and gastrointestinal symptom screening might make people be diagnosed earlier and achieve better outcomes. Third, installing radiation infrastructure and training oncology personnel should be a top priority by the government and health authorities as people living in distant places can receive equal care. Nevertheless, the research is limited in some ways. It is situated in hospitals and therefore may not have captured all the cancer cases in the community particularly those which do not attend the hospital or get treatment elsewhere. Moreover, there was no thorough investigation through histology and survival results as a result of poor documentation. The present research provides the first comprehensive evaluation of the cancer burden on Pir Panjal region, and forms a baseline of the further population based research.

CONCLUSION

This study provides the first comprehensive examination of the cancer rates among residents in the Pir Panjal region of Jammu and Kashmir which is traditionally not included in the literature of cancer epidemiological research. The findings indicate that the gastrointestinal cancers are the most prevalent cancers among this population of individuals, then there is the breast and lung cancer. Many of the cases are identified in their late stages (Stage III and IV). Gastrointestinal cancers with low occurrence of oral and cervical cancers indicate a regional pattern similar to that of the Kashmir Valley but not similar to other parts of India. The results indicate that there is an urgent need of preventable risk factor mitigation by provision of early recognition and screening programs, public awareness campaigns and tobacco control measures. It is equally important to establish a population-based cancer registry (PBCR) that will adequately capture incidence, trends and outcome. The absence of a radiotherapy facility in the area indicates a massive gap in infrastructure that should be sealed to ensure that everybody can access cancer care. The paper highlights the fact that the problem of cancer in the Pir Panjal area is a rising menace among the populace that requires concerted action by improving healthcare facilities, early detection and specific cancer management methods.

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