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Mapping the Oncological Landscape: Insights from the Oncology Care Clinic at Rawalpindi Medical University

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Abstract

Aims

This cross-sectional study conducted from August 4, 2022, to November 8, 2023, focused on determining the frequency of different types of cancer among individuals receiving care at the Oncology Care Clinic at Rawalpindi Medical University.

Methodology

A retrospective analysis was performed on comprehensive data extracted from electronic records of 380 oncology patients. The study encompassed individuals of all genders and ages, ranging from new-borns to 100 years and above. Data included demographics, diagnoses, treatments, and outcomes. A statistical analysis was conducted using SPSS software, version 26.

Results

Females exhibited a significantly higher incidence of malignancies (65.70%) compared to males (33.90%). The most common age group affected by the issue were middle-aged individuals between 40 and 59 years old, making up 41.05% of the affected patients. Gynaecological cancers, particularly ovarian cancer, were most prevalent (32.8%), followed by haematological malignancies, with leukaemia being the most common subtype (20.2%). Breast cancer, pulmonary lung cancer, and urogenital cancer had lower registration rates. Referrals from the gynaecology department at Holy Family Hospital, Rawalpindi, were predominant.

Scientific Novelty

This study contributed to existing literature by providing insights into the prevalence and distribution of malignancies among oncology patients in Rawalpindi and surrounding areas. The findings underscored the demographic patterns, prevalent cancer types, and referral trends, while also highlighted the need for enhanced data management and integrated cancer registry systems in the region.

Conclusion

The study highlighted the significance of continuous monitoring and strong data platforms for successful cancer treatment. It underscored the necessity for coordinated efforts to improve cancer diagnosis, treatment, and patient care. The establishment of an integrated cancer registry system could facilitate the comprehensive data collection and analysis, leading to better understanding and management of cancer in the community.

Keywords: health surveillance; cancer epidemiology; cancer registry systems.

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Introduction

Cancer continues to represent a significant worldwide public health issue, with a disproportionate burden in low and middle-income countries like Pakistan. Approximately 10 million new cancer cases are diagnosed annually, with 5.5 million cases in less-developed countries and 4.7 million cases in more developed nations. In the USA alone, there were 1,958,310 new cancer cases and 609,820 cancer-related deaths reported in 2023 [1]. According to projections for 2040, Asia is expected to see a significant rise in newly reported cancer cases, increasing from 9.39 million in 2020 to 14.2 million in 2040. Additionally, the number of cancer-related deaths is also projected to increase, from 5.75 million in 2020 to 9.67 million in 2040 [2].

The escalating incidence of cancer in Pakistan presents a significant public health challenge, prompting sustained governmental efforts. Cancer is a major cause of illness and death, placing a heavy strain on healthcare systems, necessitating a comprehensive understanding of its patterns and trends for effective prevention, diagnosis, and treatment to significantly improve patient management and contribute to the broader healthcare landscape. In developing future policies to tackle the prevalence of cancer, cancer registries have become invaluable resources, providing valuable data on genetic, epigenetic, and epidemiological factors associated with the disease [3, 4, 5]. The demographic data recorded in cancer registries are influenced by numerous factors, including variations in genetic, epigenetic, and environmental risk factors, cancer screening programs, and the accessibility of treatment and diagnostic services. To interpret and predict cancer incidence in the future, epidemiological studies are essential to better understand the evolution of cancer risk factors [6].

Cancer remains the primary cause of mortality, highlighting the urgent need for developing nations in Asia to prioritise preventative and early detection efforts [7]. Recognising the need for detailed insights into the landscape of cancer incidence, this study explores the registered data of cancer patients at the "Rawalpindi Medical University Oncology Care Clinic."

Cancer is on the rise in Pakistan, as it is in most developing nations, posing a significant risk to public health. Multiple factors contribute to the impact of cancer, including environmental pollutants, genetic predispositions, population growth, aging, lifestyle changes, and limited access to healthcare resources [8, 9]. Certain cancers, such as those of the breast, oesophagus, stomach, and liver, have demonstrated notable prevalence, further emphasising the urgency of robust data collection and analysis to guide effective cancer control strategies [10].

Research Problem

The study aimed to explore the landscape of cancer incidence in Rawalpindi and surrounding districts, utilising data from the Oncology Care Clinic at Rawalpindi Medical University. By analysing patient demographics, diagnoses, treatments, outcomes, and referrals, the research sought to elucidate prevalent cancer types, demographic trends, and potential areas for targeted interventions.

Objectives

- To assess the frequency of different types of cancer among patients visiting the Oncology Care Clinic;
- To investigate how age, gender, and geographic location impact the likelihood of developing cancer;
- To examine the most common types of cancer and how they are spread among different demographic categories;
- To assess the role of the Oncology Care Clinic in providing comprehensive data for understanding cancer incidence patterns.

Research Methodology

General Background

The methodology employed in this study involved a retrospective retrieval of data from electronic records of patients visiting the Oncology Clinic at Rawalpindi Medical University. The retrospective data retrieval allowed for the examination of past patient records, offering valuable insights into historical trends and patterns of cancer incidence. By analysing electronic records, this study aimed to leverage existing data resources to provide a comprehensive understanding of the oncological landscape in the region. This methodology enabled researchers to explore demographic factors, diagnostic information, treatment modalities, and outcomes, facilitating evidence-based decision-making in cancer management.

Study Design

This was an observational cross-sectional study of patients registered at the oncology clinic. The clinic's electronic records were retrospectively retrieved from August 4, 2022, to November 8, 2023, comprising 380 reported patients.

Participants

All patients who were referred to the clinic with a suspected or confirmed diagnosis of malignancy were included in the study. Patients who were excluded from the study had either unverified identification documents or incomplete/missing medical records.

Data Collection

A performa was designed to record the variables, including the file number, the identification number, age, gender, and demographic information, along with the diagnosis, details of biopsy, treatment timeline, stage at presentation, outcome of registered cases, distribution of cancer system-wise, and referrals to and from other care units.

Data Analysis and Statistical Approaches

The statistical analysis of the data was meticulously conducted in order to ensure a comprehensive understanding of cancer incidence patterns. A specific attention was given to the application of chi-square tests to assess quantitative correlations across variables. A significance level of ≤ 0.05 was utilised to determine the statistical significance of the findings. SPSS 26.0 was chosen as the statistical software due to its robust capabilities in handling large datasets and conducting complex analyses. The analyses were tailored to the study's aims, focusing on identifying prevalent cancer types, demographic trends, and potential areas for targeted interventions.

The data were categorised to facilitate meaningful analysis. Variables such as age groups, gender, geographic location, and cancer types were systematically recorded and cross-referenced for statistical validation. This rigorous approach ensured the accuracy and reliability of the findings, allowing for confident interpretations of the results.

Research Results

The statistical analysis of 380 patients included in the study revealed that 211 (55.50%) patients had a confirmed cancer diagnosis based on cytology or histology; 108 (28.40%) cases were suspected cases, 40 (10.50%) were non-oncologic cases, and 21 (5.50%) were under surveillance. The findings revealed that malignant tumors were higher among females ($n = 250$, 65.70%) than among males ($n = 129$, 33.90%). Demographically, 45% of visiting patients were from Rawalpindi district, followed by AJK (43%), Chakwal (27%), Jhelum 6%, Attock 6%, Mianwali 4%, and Talagang 2% (Table 1).

Table 1. Baseline demographic distribution of oncology cases

Total number of registered patients (n = 380)	Number (n)		Percentage (%)
Confirmed	211		55.50%
Suspected	108		28.40%
Non-Oncology	40		10.50%
Surveillance	21		5.50%
Demographic Area			
Rawalpindi	171		45%
Islamabad	23		6%
Jhelum	22		6%
Attock	22		6%
Mianwali	16		4%
Azad Kashmir	43		11%
Talagang	8		2%
Chakwal	27		7%
Others	48		13%
Gender			
Male	129		33.90%

Female	250	65.70%
She male	1	0.20%
Age group		
0-19 years (Young)	24	6.32%
20-39 years (Young Adult)	84	22.11%
40-59 years (Middle-aged)	156	41.05%
60-79 years (Senior)	105	27.63%
>80 years (Elderly)	11	2.89%

The highest number of cases ($n = 156$, 41.05%) were observed in middle-aged individuals (40-59 years), followed by seniors (60-79 years) at 27.63% ($n = 105$), and young adults (20-39 years) at 22.11% ($n = 84$). The age groups of young (0-19 years) and elderly (above 80 years) individuals had a frequency of 6.32% ($n = 24$) and 2.9% ($n = 11$), respectively.

Gynaecological malignancies ($n = 125$, 32.8%) comprised the highest proportion of registered cases (Figure 1).

These included ovarian cancer ($n = 93$, 74.4%), uterine cancer ($n = 22$, 17.6%), cervical cancer ($n = 8$, 6.4%), and vulva cancer ($n = 2$, 1.6%). Hematological malignancies accounted for 20.2% of the total cases ($n = 77$), with leukaemia ($n = 53$), lymphomas ($n = 21$), and plasma cell tumors ($n = 3$) being the most prevalent types. Breast cancer ($n = 26$, 6.8%) was the third most frequently occurring, followed by gastrointestinal malignancies (GI) ($n = 24$, 6.3%), stomach cancers ($n = 9$, 37.5%), colorectal cancer ($n = 8$, 33.3%), small intestinal tumors ($n = 6$, 25%). The two least common tumors that were registered were pulmonary lung cancer ($n = 16$; 4.2%) and urogenital cancer ($n = 8$; 2.1%), 50% of which were renal cell carcinoma ($n = 4$) and 50% were prostate cancer ($n = 4$).

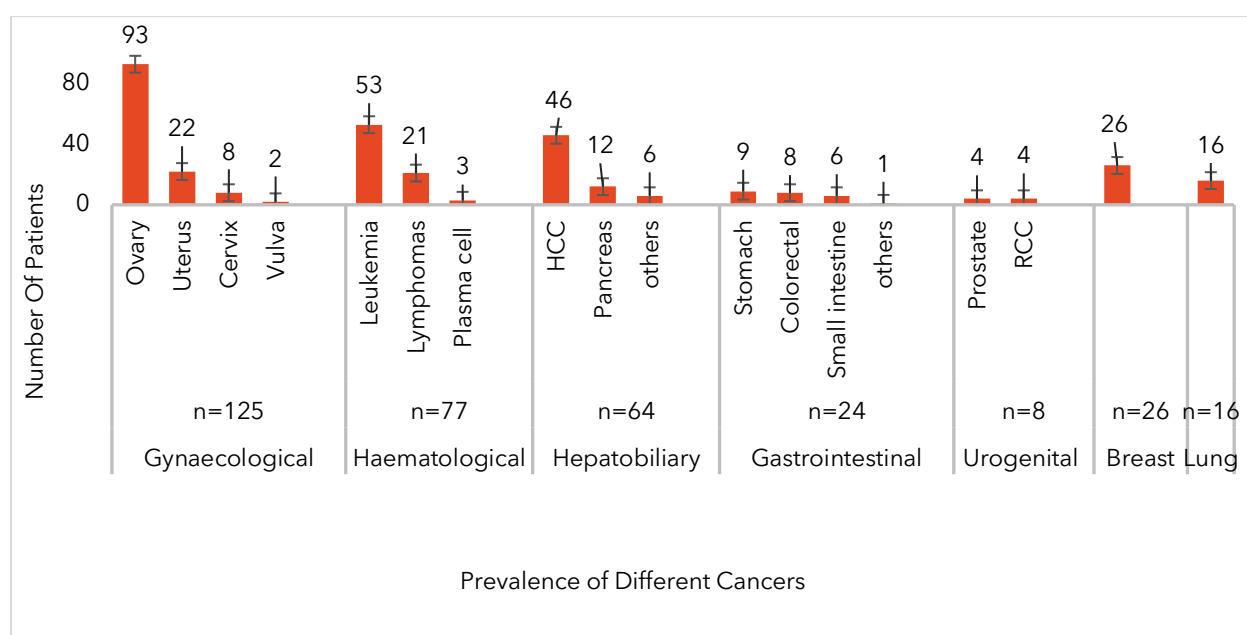


Figure 1. Graphical distribution of trending cancers registered at oncology care clinic

Patients diagnosed with gynaecological and haematological malignancies were between the ages of 40 and 59 years. Hepatobiliary malignancies can affect individuals of all ages, but they are most common in the 60-79-year-old group, with a preponderance of males ($\chi^2 = 0.124$, p -value = 0.725). A greater proportion of patients diagnosed with GI and pulmonary malignancies were in the 60-79 age group. Most of the breast and urogenital cancer patients were between 40 to 59 years and > 60 years groups, respectively; all results were statistically significant (Table 2).

Table 2. Distribution of various malignancies*

Distribution of various malignancies									
Type of malignancy	Age group (years)					Gender		Statistics	
	0-19	20-39	40-59	60-79	> 80	M	F	Chi-sq χ^2	p-value

Gynecological cancers								2.368	0.124
Ovarian	7	29	36	0	0	0	72		
Uterine	0	4	10	0	0	0	14		
Cervical	0	2	6	0	0	0	8		
Vulva	0	0	0	1	0	0	1		
Total Cases	7	35	52	1	0	0	122		
Hematological Malignancies									
Leukaemia	2	6	12	6	0	9	17	0.221	0.638
Lymphomas	6	10	14	12	2	22	22		
Plasma Cell Tumour	0	1	1	2	0	2	2		
Hepatobiliary Malignancies									
HCC	0	2	21	22	3	27	20	0.124	0.725
CA Pancreas	1	0	5	8	3	10	7		
Others	0	0	1	0	0	0	1		
Gastrointestinal Malignancies									
CA Stomach	0	0	6	7	0	10	3		
Colorectal CA	0	4	2	3	0	5	4	0.928	0.335
CA Small intestine	0	0	2	4	0	2	4		
Others	0	1	0	0	0	0	1		
Pulmonary Cancer									
CA Lung	0	1	5	9	2	9	8		
Urogenital Cancer									
CA Prostate	0	0	0	2	2	3	1	0.75	0.386
RCC	0	0	1	1	1	0	3		
Breast Cancer									
CA Breast	0	4	13	7	0	0	24		
Others (metastatic disease with unknown primary cause)									
	5	7	11	12	0	14	21		

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Others (metastatic disease with unknown primary cause)									
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*The allocation of individuals into age categories based on gender counts. The Chi-square test (χ^2) through linear-by-linear association and p-values confirm a significant correlation between age groups and gender.

The success rate for radio-guided procedures performed at the Oncology Care Clinic was 92.5% (n = 67). Most of the patients referred to the clinic were from Holy Family Hospital, Rawalpindi (Table 3).

Table 3. Outcome of patients at the oncology clinic

Functional status of patients	Patients (n)	Percentages (%)
Total Active Cases	150	39.4% of total cases
Active Confirm	117	78% of active cases
NORI Cases	51	43.5% of active confirmed cases
Non-NORI Cases	66	56.4% of active confirmed cases
Active Suspect	13	8.6% of active cases
Active Surveillance	20	13.3% of active cases
Total Nonactive Cases	230	60.5% of total cases
Lost To Follow	25	10.8% of total nonactive cases
Confirm Cases	12	48% of lost to follow cases
Suspected Cases	12	48% of lost to follow cases
Surveillance	1	4% of lost to follow cases
LAMA	38	16.5% of total nonactive cases
Confirm Cases	13	34.2% of LAMA cases
Suspected Cases	25	65.7% of LAMA cases
Deceased	127	55% of total nonactive cases
Confirm Cases	69	54.3% of expired cases
Suspected Cases	58	45.6% of expired cases
Non-Oncology	40	17.3% of total nonactive cases

Radio-guided Procedures		
Performed at the oncology care clinic	67	(92.5% success rate)
performed at HFH	20	29.8- (80% success rate)
performed outside HFH	47	70.1- (98% success rate)
Sources of Oncology Case Referrals		
Departments within HFH	319	84%
THQ Taxila	26	7%
Private Setup	7	2%
THQ Gujar khan	3	1%
NORI	9	2%
Others	16	4%

Discussion

Pakistan is classified as a low-middle-income country by the World Bank. Contrastingly, there are varying patterns of cancer incidence between developing and developed nations. Financial constraints combined with cultural and religious beliefs can potentially prevent people from obtaining timely medical attention, resulting in late diagnosis and lethal outcomes [11,12]. This study aimed to enhance the understanding of the demographics and characteristics of individuals affected with cancer and identify patterns and variations in the most prevalent forms of cancer in Rawalpindi and the surrounding districts. This information is essential for creating targeted interventions, allocating resources effectively, and developing personalised treatment strategies.

This was a single institution-based study, and the data were compared with that published previously from our center [13] and other studies conducted at the national and international levels. The cases were categorised on the basis of gender, age, demographic location, and organ/system involvement. The data indicated that the majority of patients were urban dwellers with low socioeconomic status. A similar finding was published previously as well [14]. The most prevalent age group for both genders was 40–79 years old, and it also corresponded with the age group that has been most frequently associated with malignancies, as reported in national and international studies [15, 16, 17].

The chi-square test was used to examine whether a significant association or correlation existed between age groups and gender. The results were statistically significant, implying that the observed distribution of cancer cases across the age groups and between genders is not attributable to coincidence. Moreover, it suggested the existence of a significant relationship that merits additional investigation or contemplation.

Haematological malignancies affected a greater proportion of females ($n = 17$) than males ($n = 9$). Conversely, men had a higher incidence ($n = 27$) of Hepatocellular Carcinoma than women ($n = 20$). Our findings were consistent with national cancer registry data indicating that there were more female cancer patients than males [18]. However, an increase in referrals from the gynaecology department can also be attributed to the increase in female patients. Previous research suggests a 60.7% increase is expected in breast cancer cases (approximately 2103 cases by 2025) [19,20]. Nevertheless, our findings deviated from this trajectory, and the paper reported more gynaecological cancer cases than breast cancer. The underrepresentation of breast cancer patients at the oncology care clinic can be plausibly ascribed to their preference for a dedicated clinic and more active referrals from the gynaecological clinic.

Ovarian cancer was the most reported cancer, along with malignancies of the uterine, cervical, and vulva. There has been an increase in the incidence of these gynaecological malignancies in Pakistan [21], and they are the most common among Pakistani females [22, 23]. Ovarian cancer ranks eighth globally among cancer-related fatalities affecting women and seventh among malignant tumours [24].

The observed increase in the incidence of gynaecological cancer may be influenced by a range of cultural, religious, socio-economic, and healthcare-related factors. Late-stage diagnosis results from insufficient education and awareness regarding gynaecological health, early detection, and preventive measures. The lack of standard medical care, such as poor gynaecological examinations, Pap smear screening for cervical cancer, high rates of HPV infection [25], and inadequate vaccination rates, may contribute to missed opportunities for early detection. Additional factors that contribute to the rise in gynecological malignancies included social stigmas, cultural conventions, high parity, early marriage, inadequate access to contraceptive methods, genetic predispositions, and environmental elements, such as exposure to specific chemicals and contaminants [26]. Haematological malignancies accounted for 20.2% of the total cases, with a higher proportion of females ($n = 17$) than males ($n = 9$). In contrast, men had a higher incidence ($n = 27$) of HCC than women ($n = 20$). Our findings correlated with those

reported by Tufail et al., 2023 [27], which indicated that Pakistan has one of the highest incidences of leukaemia and hepatobiliary malignancies.

In order to successfully address the numerous challenges linked to cancer cases in Pakistan, a comprehensive strategy is essential: improving healthcare infrastructure, conducting awareness campaigns, implementing effective screening programs, and considering sociocultural determinants. This necessitates reliance on current epidemiological data and cancer registries that are specific to the region. By sharing and disseminating this comprehensive dataset, it is possible contributing to the collective knowledge base in the field of oncology, ultimately influencing evidence-based decision-making and improving patient outcomes in these clinics. Furthermore, it provides numerous benefits that extend to the strategic management of resources, infrastructure development, and allocation of funds within the healthcare framework of Rawalpindi Medical University and its affiliated hospitals.

Limitations of the study

This study comprised data from a single center that served patients from neighboring districts only and did not provide services to the general population; thus, a population-based study is required to ascertain the extent and distribution of cancer in each region. As Cancer incidence continues to increase worldwide, developing countries such as Pakistan are struggling to effectively manage the growing burden of this disease. The Rawalpindi Oncology Clinic serves as a crucial institution in understanding cancer patterns and trends in the region. This study maps the oncological landscape in Pakistan and offers recommendations for improving cancer management.

A holistic strategy is essential for effectively managing cancer incidents in Pakistan. Healthcare institutions can take practical steps to improve infrastructure, awareness, and screening programs. By investing in state-of-the-art facilities, raising public awareness about cancer prevention and early detection, and implementing robust screening programs, healthcare providers can enhance the early diagnosis and treatment of cancer, ultimately improving patient outcomes. Cancer registries play a crucial role in informing evidence-based policy-making. To enhance their effectiveness, specific recommendations include improving data collection methods, standardising data reporting practices, and implementing data-sharing mechanisms between institutions. By streamlining data collection and sharing processes, policymakers can access timely and accurate information to inform cancer prevention and control strategies, ultimately reducing the burden of cancer in the region.

Electronic data management systems and cross-institutional collaboration are vital for overcoming existing barriers in cancer management. By implementing electronic health records and fostering collaboration between healthcare institutions, stakeholders can improve data accessibility, accuracy, and interoperability. Such a collaborative approach can enable the healthcare providers to share resources, expertise, and best practices, ultimately improving cancer diagnosis, treatment, and patient care across the region.

Conclusions and Implications

In conclusion, the Rawalpindi Medical University Oncology Care Clinic is an institution of critical importance in the region, where a comprehensive cancer registry has been established in order to document and analyse patient data of cancer patients systematically. The primary objective of this registry is to provide a foundation for evidence-based decision-making in healthcare policy, resource allocation, and research initiatives, as well as to shed light on the current state of cancer. The oncology clinic provides health services and facilitates oncology patients from Rawalpindi and nearby districts. It is equipped with a variety of surgical operations and imaging techniques, such as magnetic resonance imaging (MRI), computed tomography (CT), ultrasound (US), and imaging-guided biopsies. Biopsies or surgical specimens are sent to the pathology laboratory for examination. The computerised medical system has detailed records of every patient's demographic (age, gender, and place of residence), sample/material collection site, sampling technique (such as needle aspiration and incisional or excisional biopsy), and histological features. This study made significant contributions to the understanding of cancer incidence patterns. By examining the registered data, prevalent cancers, demographic trends, and potential domains for targeted interventions were identified. The aim was also to contribute to and strengthen the ongoing efforts to mitigate the consequences of cancer in Pakistan, thereby fostering a more proactive and practical approach toward cancer treatment. This research can potentially improve the accessibility of pertinent oncological services for socioeconomically disadvantaged patients and fulfill their healthcare requirements. Additionally, it provided medical authorities with the latest updates on cancer cases in Pakistan to help devise funding strategies and legislation throughout the country.

This observational study pertaining to oncology patients visiting the clinic has provided valuable insights into the significance of cancer registries in understanding and managing cancer care. Data collection, analysis, and interpretation have illuminated various aspects of cancer incidence, prevalence, and treatment patterns among the patient population. This data obtained from the Oncology Care Clinic at Rawalpindi Medical University and its allied hospitals can significantly improve the situation of health care system of Pakistan.

Suggestions for Future Research

Future research at the Oncology Care Clinic of Rawalpindi Medical University could focus on longitudinal studies to track changes in cancer incidence and demographic trends over time, providing insights into evolving cancer epidemiology. Comparative analyses could explore regional variations in cancer management practices within Pakistan, guiding the implementation of tailored interventions. Additionally, qualitative research methods could complement quantitative data analysis by uncovering patient, caregiver, and healthcare provider perspectives on cancer care experiences. Intervention studies within the clinic could evaluate the effectiveness of targeted interventions such as awareness campaigns or screening programs. Finally, health services research could investigate healthcare delivery, resource allocation, and infrastructure within the Oncology Care Clinic to identify areas for improvement and optimize cancer care delivery. These research avenues have the potential to enhance the understanding of cancer management practices at Rawalpindi Medical University and contribute to the development of evidence-based interventions to improve patient outcomes.

Declarations

Author Contributions

Conceptualisation, Muhammad Umar; Qaiser Aziz; Asma Umer Khayam; methodology, Urwah Tehreem; Asma Umer Khayam.; software, Asma Umer Khayam; formal analysis, Qaiser Aziz; Asma Umer Khayam; writing–original draft preparation, Asma Umer Khayam; writing–review and editing, Asma Umer Khayam; Qaiser Aziz; Urwah Tehreem. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Data are available on the request due to ethical restrictions. The data presented in this study are available on request from the corresponding author.

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Institutional Review Board Statement

The study was disclosed to the Ethical Review Board, which granted an exemption from the comprehensive assessment due to its retrospective nature and the absence of personally identifiable information in the provided data.

Informed Consent Statement

The study was disclosed to the Ethical Review Board, which granted an exemption from the comprehensive assessment due to its retrospective nature and the absence of personally identifiable information in the provided data.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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