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Comparison of presentation and performance status between cancer patients residing in rural and urban areas of Punjab, Pakistan

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ABSTRACT

Background: Cancer has a diverse presentation in the population which may be affected by factors such as equity of healthcare access, distance from cancer care centers, and affordability of cancer treatment. This study aimed to record disparities among the stage of presentation and performance status in patients presenting to a tertiary care cancer center from rural and urban backgrounds.

Methods: An observational cross-sectional study was carried out at a tertiary care cancer center from September 2019 to August 2020. Two hundred and ninety-five patients from both urban and rural areas were included. Patient characteristics were recorded using an interview-based questionnaire and ECOG performance scale, and were similar in both groups. Data analysis was performed using SPSS 24.0, with qualitative statistics determined as frequency and percentages, and quantitative correlations among variables determined by application of a chi-square test with p-value ≤ 0.05 as significant.

Results: In this study, 150 (50.8%) of the participants were female; 52.9% were from urban areas. A significant proportion of the patients had either stage III (20.3%) or stage IV (60%) disease on presentation. More than 50% of the patients had an ECOG performance status score of either 3 (36.9%) or 4 (20%) on presentation or during admission. No significant associations were present between location as urban or rural and stage of cancer (ρ=0.076, p=0.194), or between location and ECOG score (ρ=-0.033, p=0.573).

Conclusion: Many of the determinants of late cancer presentation are similar among urban and rural areas, and patient education, mass screening programs, and the involvement of primary care physicians in cancer care can play an effective role in subverting this problem.

Keywords: cancer disparity; health service accessibility; cancer care; rural-urban background.

Introduction

In a world affected by viral pandemics, various communicable and non-communicable diseases, and strained health resources, cancer remains a slowly yet surely growing menace, with 19.2 million new cases worldwide reported in 2020 alone.[1]There is often a significant disparity in the distribution of healthcare resources between rural and urban areas, with rural areas frequently lacking essential health services.

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In Pakistan, 67.5% of the population lives in rural areas, whereas in Punjab, the percentage of rural population is 68.7%.[2] Therefore, most of Pakistan's population is deprived of healthcare facilities available in metropolitan areas, including screening, diagnostic, and management facilities. This is further complicated by a scarcity of oncology facilities in the country overall; with a ratio of only 0.027 medical oncologists per 100,000 population in Punjab alone, adequate cancer care is a privilege few can access or afford .[3] A worse survival rate has been demonstrated for rural patients, particularly in the setting of lung, colorectal, prostate, and cervical cancers.[4] The disparities among

rural and urban populations have been explained by multiple factors, including delayed diagnoses, stage of presentation, treatment modalities, socioeconomic status, and access to health care.[5] The disparities may also reflect inequalities in smoking and other cancer-related risk factors, screening, and treatment.[4]

While many factors have been described as causative for rural-urban disparities, studies have shown that uniform access to cancer care can help resolve the disparity in outcomes between rural and urban populations.[6]The impact of socioeconomic deprivation on cancer-related mortality has been found to be considerably greater than the impact of a rural-urban continuum.[4] The socioeconomic gradients are also much steeper in rural areas than in urban areas, which could be a cause of higher cancer mortality in rural areas.

Rural cancer care centers are practically non-existent in Pakistan, and the vast majority of patients from these areas are referred, often at a time when their disease has metastasized, to urban cancer care centers, which are grossly deficient in facilities as well.[3] The disparities in healthcare infrastructure are often discouraging for patients, which practically forces them to fare a far worse prognosis than they would in the presence of adequate facilities. In a cross-sectional survey conducted across three major hospitals in Punjab, it was revealed that rural patients and patients from poor socioeconomic classes are more likely to present with advanced, often incurable cancers .[7, 8]

The aim of this study was to record disparities among stage of presentation and performance status in patients presenting to Mayo Hospital Lahore from rural and urban backgrounds. Even though comparing survival rates between the two populations was a key goal, it had to be abandoned. This was because of the large number of patients who were lost to follow-up, and the fact that there was no institutional or provincial database of cancer patients that could be used.

Methods

An observational cross-sectional study was carried out in the Oncology & Radiotherapy department of Mayo Hospital Lahore, a 3000 bedded tertiary care facility serving as the primary referral center for oncology patients from Punjab, from September 2019 to April 2020.295 patients from both urban and rural areas were included and it was calculated by random sampling. Inclusion criteria was patients of both genders, aged 18-70 years with a confirmed diagnosis of malignancy who either presented to the Oncology outpatient or were admitted as in-patients in the Oncology ward during the study period. Only those cases in which contact details or data regarding stage of presentation and current performance status were unavailable were excluded. Ethical approval of the study was obtained from the Institutional Review Board of King Edward Medical University Lahore (IRB number 173/RC/KEMU) dated 11-10-2018.

A short-structured questionnaire was used to collect details of the patients. Patient records were utilized to fill the questionnaire; in cases where the patient was admitted, short interviews were conducted to aid the data collection process after due consent. The questionnaire included a section of demographic details such as age, gender, city or district, occupation, income, and BMI; as well as a section on details regarding the cancer diagnosis (including staging, grading, metastasis, family history and treatment attributes); and the ECOG performance status scale. The ECOG (Eastern Cooperative Oncology Group) guidelines for performance status include the following criteria (table 1):

Table 1: ECOG Performance Status Criteria

Grade	ECOG Performance Status
1	Fully active, able to carry out all pre-disease performance without restriction
2	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature e.g. light house work, office work
3	Capable of only limited self-care; confined to bed or chair more than 50% of waking hours
4	Completely disabled; cannot carry out any self-care; totally confined to bed or chair
5	Dead

Data analysis was performed using SPSS 24.0, with qualitative statistics determined as frequency and percentages, and quantitative correlations among variables determined by application of chi-square test with p-value ≤ 0.05 as significant.

Results

A total of 295 patients were included in the study, with 150 (50.8%) of the participants being female. Mean age of the participants was 49.46 ± 15.26 years. More than half of the participants 156 (52.9%) were from urban areas. Average distance between the site of residence and the tertiary care center was 108.2 kilometers, with the farthest distance being greater than 500 kilometers. The body mass index (BMI) of the participants was 21.51 ± 4.03 kg/m^2. Majority 183 (62.2%) of the patients were smokers, with the average number of pack years being 28.53 ± 9.06 years; almost

97% (286 patients) of the patients had a family history of malignancy as well.

Table 2 highlights the main sites of cancers in our patient population in which the most common site for cancer was gastrointestinal and least common was thyroid. A significant proportion of the patients had either stage III (20.3%) or stage IV (60%) disease on presentation (table 3), with distant metastasis present in 48.5% (143/295) of the patients. In the majority of patients, chemotherapy alone was the mainstay of treatment (42.4%), followed by a multimodal approach using chemotherapy and surgical excision in 14.9% of the patients. More than 50% of the patients had an ECOG performance status score of either 3 (36.9%) or 4 (20%) on presentation or during admission.

No significant associations were present between location as urban or rural and stage of cancer (ρ=0.076, p=0.194), or between location and ECOG score (ρ=-0.033, p=0.573). Moreover, no significant differences were present in regards to stage of cancer (ρ=-0.021, p=0.725) or ECOG score (ρ=0.023, p=0.690) against distance travelled by patients to reach the hospital.

Table 2: Main sites of cancers

System	N (%)
Gastrointestinal	77 (26.1%)
Breast	71 (24.1%)
Skin and Soft tissue	54 (18.3%)
Genitourinary	50 (16.9%)
Pulmonary	24 (8.1%)
Central Nervous System	10 (3.4%)
Bone	6 (2.0%)
Thyroid	3 (1.0%)
Total	295 (100)

Table 3: Stage of Cancer at presentation

Stage	N (%)
I	18 (6.1%)
II	40 (13.6%)
III	60 (20.3%)
IV	177 (60%)
Total	295

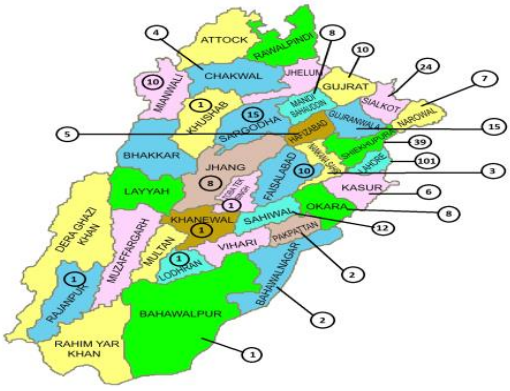

Figure 1: Patient distribution per district

Subgroup analysis showed that urban residents traveled a distance of 63.6±113.4 km to reach the treating facility, whereas rural residents traveled 158.2±170.7 km to reach the same facility. GI malignancies were the most common in rural population (25.2%), followed by breast (23%) and genitourinary malignancies (20.9%). A majority of rural patients presented at either stage IV (55.4%) or stage III (24.5%), with advanced ECOG scores of 3 (36%) or 4 (23%). The frequency of various malignancies by site was almost similar in urban population, with GI malignancies leading at 26.9%, followed by breast (25%) and skin and soft tissue tumors (20.5%); however, the incidence of stage IV cancer presentation was higher (64.1%), and ECOG scores of 2 (34%) and 3 (37.8%) were more prevalent.

Discussion

The rural-urban cancer divide becomes pronounced in lower income countries, where late stages of presentation associated with a poorer prognosis are already the norm. This inequity exists throughout the spectrum of healthcare, with one population based study showing gross inequity in access to surgical care across rural and urban populations [9].

Cancer care is no exception to this. In a study on cancer prevalence in rural vs urban regions, and the role of socioeconomic status on presentation, higher cancer incidence was found among rural residents (57.7%) and among those with poor socioeconomic background (65.9%).[8] Our study was a single center study, and showed an almost equal ratio of rural and urban patients, which we attribute to the fact that our hospital is a tertiary care center and the main point of referral from all other district and tertiary care public sector hospitals.

The incident burden of different cancers in Punjab according to Globocan ranks breast cancer as the most prevalent, followed by lip/oral cavity and lung cancers .[10,] In our study, breast (24.1%) and gastrointestinal (26.1%) were the most prevalent cancers; the higher prevalence of GI tumors can be attributed to the inclusion of all esophageal, lip/oral cavity, and colorectal tumors under the same system. Most of our patients presented with stage III or IV cancers; this is consistent with multiple studies showing delayed presentations for breast, [12, 13] oral cavity [14] and other cancers in Pakistan, with the major causes being lower socioeconomic class and social factors.

Our study found that more than 50% of the patients had an ECOG performance status score of either 3

(36.9%) or 4 (20%) on presentation or during admission. Higher ECOG scores have been linked to higher incidence of anxiety and depression among cancer patients. [15]Although we found no significant relationship between rural or urban residence and ECOG scores, nevertheless the higher ECOG scores noted during our study pose an important additional risk factor for poorer cancer prognosis.

Rural communities not only suffer from a lack of or inequity of resources; they also face other problems, such as lower enrollment in clinical trials [16]; and lack of access to effective screening programs. [17] Rural patients have to travel a long distance to reach cancer care facilities in big cities; although government hospitals provide free of cost hospitalization, the brunt of treatment is often borne by the patients themselves.[18]

Interestingly, while urban patients in our study traveled a significantly lesser distance compared to rural patients to reach the tertiary care center, the incidence of late stage (III and IV) cancer was slightly higher in the urban population (80.8%) compared to the rural population (79.9%). This indicates that despite closer access to healthcare facilities, including cancer care centers, delayed presentation does not vary between the urban and rural subgroups. This rural-urban disparity in cancer presentation warrants long term prospective studies to delineate a definite impact of rurality on cancer presentation and mortality. In a study on breast cancer presentation across rural and urban areas, rurality was found to be associated with a statistically increased stage of cancer on presentation, as well as an increase in overall mortality .[19] Other studies have also shown an increased rate of late-stage cancer diagnosis in rural and deprived areas; this has been attributed to some degree to limited access to cancer care, lower screening rates, and lack of health insurance. [20]

In a population based registry analysis of cancer incidence and trends among rural and urban populations in the US, higher incidence of all-site cancers was observed in the urban population, with breast, prostate, GI and thyroid malignancies leading, in contrast to a higher incidence of tobacco and HPV related malignancies in urban populations. The higher overall incidence rate in urban areas did not vary on the basis of sex, ethnicity, or region. Although the overall trends pointed to a decline in cancer incidence over time, the observation was more significant for urban rather than rural areas .[21] In a similar study from China, the age-standardized incidence of cancer was higher in the urban population compared to the rural population, especially for colorectal cancer and female breast cancer; however the 5-year observed and relative survivals of cancer patients were also higher in the urban population .[22] According to India population-based registries, age-standardized cancer incidence rates in urban NCRP cancer registries in India for the period 1990-96 ranged from 97.8 to 121.9 per 100,000 for men and from 92.2 to 135.7 per 100,000 for women. The Delhi registry recorded the highest incidence for both men and women, whereas the rates from the rural population-based registry in Barshi (in the Western Indian state of Maharashtra) were the lowest, at 46.2 and 57.7 per 100,000 for men and women, respectively .[23]

Since a country-wide cancer registry is not available in Pakistan, we recommend that a prospective population based study should be carried out to observe trends in cancer incidence, mortality, and survival across rural and urban populations.

An interesting, although hitherto unexplored theme in this regard is the role of primary care physicians in dispensing cancer treatment in rural areas. Primary care physicians with basic knowledge of oncology, having direct communications with oncology colleagues in urban areas as well as a uniform referral system, [24] can made easy the screening and referral process for rural patients. With basic health units (BHUs) distributed in all major rural areas, and the advent of telemedicine, primary care can provide a well-balanced platform for improving cancer care equity in rural areas.

Our study has some limitations: study design is cross-sectional, and did not follow the survival rate among patients from urban and rural areas, a statistic which is widely lacking. Moreover, as a single center study from a tertiary center where patients are mostly referred, our presenting population is biased in favor of more urban patients. A large multicenter study, especially in urban areas surrounded by rural centers, with a longitudinal study design would delineate our objectives more clearly. Nevertheless, to our knowledge our study is the first in Pakistan to compare performance status on the ECOG scale, as well as to link urban/rural residency of the patient to stage of cancer and performance status.

Conclusion

In the cancer care continuum, wide disparities exist between urban and rural centers. With most of specialized oncological care in Pakistan focused in urban areas, rural patients have to travel far and wide to reach cancer hospitals. While this is not statistically

linked to poor performance status or worse stage of cancer, it nevertheless provides an important rationale for improving cancer access in rural areas. It also pinpoints that many of the determinants of late cancer presentation are similar among urban and rural areas, and patient education, mass screening programs, and the involvement of primary care physicians in cancer care can play an effective role in subverting this problem.

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