



FACTORS ASSOCIATED WITH DELAY IN CANCER DIAGNOSIS AND TREATMENT IN CHILDREN, A STUDY FROM NORTHERN PAKISTAN.

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ABSTRACT... This study explores various factors responsible for delay in management of Pakistani children having malignant diseases. **Study Design:** Cross-sectional, observational study. **Setting:** Pediatric Oncology Unit of Combined Military Hospital Rawalpindi. **Period:** 1st March 2017 to 31st August 2017. **Material and Methods:** A total of 147 children, up to 15 years of age, being managed for malignant diseases were enrolled. Data was collected by reviewing the medical record and face-to-face interviews of the parents. Time lag from onset of symptoms to start of treatment was divided in three categories, patient delay, physician delay and treatment delay. Various factors associated with delay were analyzed. **Results:** Out of 147 patients, 114 were male and 33 were female. Mean age was 5.76 (\pm SD 3.15) years. Mean patient delay was 13.36 (+ SD 27.21) days. Mean physician delay was 66.22 (+ SD 87.66) days and mean treatment delay was 17.61 (+ SD 46.20) days. In 34% of patients total delay was > 90 days. Important factors associated with delay were age of patient, type of malignancy, financial problems, distance from healthcare facility, parents' education status, their perception about usefulness of treatment and use of alternative therapies. Patients' gender was not significantly associated with delayed management. **Conclusion:** One third of our patients had to wait for three months or more for definitive treatment to start. Physician delay was more than patient or treatment delay. It signifies that our health care system is not well equipped to promptly handle malignant diseases in children. Better training of medical professionals and improvement in diagnostic facilities can result in reduced time lag before definite treatment.

Key words: Cancer, Children, Chemotherapy, Delay, Early Diagnosis, Pakistan.

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INTRODUCTION

According to International Agency for Research on Cancer (IARC), childhood cancers account for 0.5-4.6 % of total malignancies.¹ These tumors are more responsive to chemotherapy than adult malignancies and chances of cure with proper treatment are relatively high.² Early diagnosis is important for timely management while disease is still in its initial stages, to achieve better outcome. It is reasonable to assume that efforts to expedite the diagnosis of malignant diseases are likely to have benefits for patients in terms of survival and improved quality of life.^{3,4}

Development of effective strategies to provide timely management of pediatric malignancies requires an understanding of factors affecting the delays and their effect on cancer prognosis.⁵

There are many publications regarding delay in diagnosis and treatment of childhood malignancies, but to best of our knowledge, no such studies have been published from Pakistan.

Parents are usually first individuals to notice any abnormal finding caused by malignant disorders. Their knowledge and attitude therefore becomes important in earlier presentation to a healthcare facility. Within healthcare facilities, various factors related to complexity of disease, professional expertise of the health care team and diagnostic facilities contribute to variable delay in final diagnosis. Treatment of these malignancies is a highly specialized job, possible in pediatric oncology units. There are few such facilities in developing countries and usually patients have to travel long distances to get to any of these

centers, resulting in further delay in start of definitive treatment.⁶⁻⁸

We have grouped the causes of delay into three categories: patient delay (time since onset of symptoms to first encounter with a healthcare professional), Physician delay (time interval between first encounter with healthcare professional and confirmation of diagnosis) and treatment delay (time interval between confirmation of diagnosis and start of treatment) (Figure-1).

MATERIALS AND METHODS

This was an observational cross sectional study, conducted at Pediatric Oncology Unit of Combined Military Hospital Rawalpindi, Pakistan. A total of 147 patients up to 15 years of age, being managed for malignant diseases were enrolled in the study. Most of our patients were from Northern Punjab, Khyber Pakhtunkhwa province and Azad Jammu & Kashmir. Parents/care givers were informed about the study and written consent was obtained. Data was collected by reviewing the medical record and face-to-face interviews of the Parents/care givers, using a questionnaire.

Time of onset of first symptom attributed to the malignant disease was asked from the parents/caregivers. The earliest prescription after onset of above mentioned symptoms was considered the evidence of first encounter with healthcare professional to calculate *patient delay*. Dates of relevant laboratory reports confirming diagnosis were used to calculate *Physician delay*. Starting date of treatment was taken from hospital record of each patient, to calculate the *treatment delay*.

Data was analyzed using IBM SPSS for Windows, version 16.0. *P value* ≤ 0.05 was considered statistically significant at 95% confidence level.

RESULTS

A total of 147 children were included in this study, 114 were male and 33 were female. Mean age was 5.76 (standard deviation ± 3.15) years.

In more than 95 % of cases, *patient delay* was less than 30 days (mean 13.36 + SD 27.21 days).

Younger age had significant correlation with early reporting to healthcare professional. Educated mothers tend to have early consultation with the doctors (*p-value* < 0.01). Fathers' education had lesser impact on patient delay (*p-value* > 0.05). Another important factor affecting patient delay was distance of healthcare center from patient's residence. A distance of more than 20 kilometer was associated with longer patient delay (*p-value* < 0.05). There was no significant difference in *patient delay* between male and female patients (*p-value* > 0.05). Families having financial problems had longer patient delay but correlation was not statistically significant. Parent's perception regarding usefulness of medical treatment of malignancies and use of alternative medicines did not affect patient delay significantly (Table-I).

Almost 45 % of our patients had *physician delay* of more than 30 days (mean 66.22 + SD 87.66 days). Factors related to increased *physician delay* included increasing age, longer distance of primary healthcare centre from residence, financial problems, illiteracy or lower education level of father, use of alternate therapies (treatment by herbal medicines, homeopathy or spiritual healers) and parental perception that medical treatment is not effective in malignant diseases (Table-II). Type of malignancy also had effect on diagnostic interval. Mean diagnostic interval was longest in case of Hodgkin lymphoma and shortest in Wilms' tumor.

Once diagnosis of malignancy was confirmed, treatment started within 2 weeks in more than 80% of children. Mean treatment delay was 17.61 days (+ SD 46.20 days). Only 4 % of children had *treatment delay* of more than one month. Factors related to increased *treatment delay* were older age, financial problems, more distance of pediatric oncology services from residence, use of alternate therapy like treatment by herbal medicines, homeopathy or spiritual healers. Parents' perception about usefulness of medical treatment in malignant diseases also had significant association with treatment delay. Parents who believed that cancer is curable, were more prompt to seek treatment for their child (*p*

value < 0.001) (Table-III).

Mean total time lag (interval from onset of symptoms to start of treatment) was 97.2 days (+ SD 108.15). Only 18.4 % children had started treatment within one month of onset of symptoms. More than one third of patients had a total delay of > 90 days (Table-IV).



Figure-1. Different categories of delay

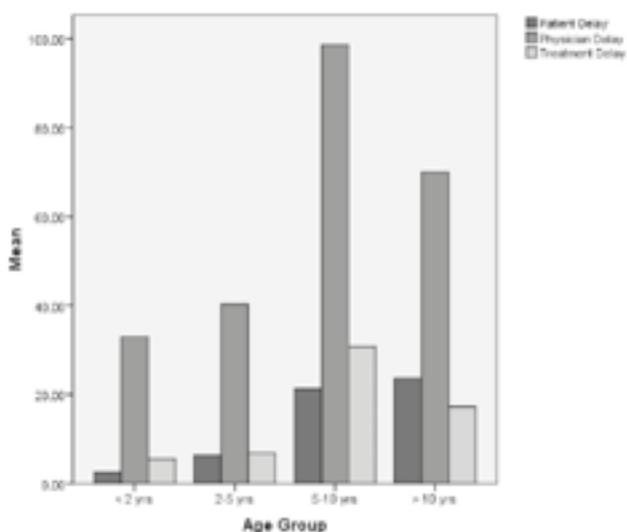


Figure-2. Mean delays (in days) in different age groups

DISCUSSION

There are many factors responsible for delay in diagnosis and treatment of children suffering from malignancies. Most of our findings are consistent with other studies published in international literature. There are however few important differences in our results. Dang-Tan and Franco reviewed 23 epidemiological studies and found that factors associated with diagnosis delays included the child’s age, level of parental education, type of cancer and presenting symptoms.

One third of our patients had to wait for more than three months, before definitive treatment. Out of three categories of time lag, physician delay was significantly longer than patient or treatment

delays. Mean physician delay was 66.22 days (+ SD 87.66 days) and it was > 30 days in 45% of patients (Table-II).

Distance to primary healthcare center	Pearson Correlation	.178*
	Sig. (2-tailed)	.031
Distance to tertiary healthcare centre	Pearson Correlation	.127
	Sig. (2-tailed)	.126
Age Group	Pearson Correlation	.281**
	Sig. (2-tailed)	.001
Gender	Pearson Correlation	-.042
	Sig. (2-tailed)	.617
Educational level of father	Pearson Correlation	-.118
	Sig. (2-tailed)	.155
Educational level of mother	Pearson Correlation	-.197*
	Sig. (2-tailed)	.017
Complementary and Alternative Medicine (CAM)	Pearson Correlation	-.120
	Sig. (2-tailed)	.149
Parental perception regarding usefulness of treatment of malignancy	Pearson Correlation	.045
	Sig. (2-tailed)	.590
Financial problems for treatment	Pearson Correlation	-.123
	Sig. (2-tailed)	.137

Table-I. Factors associated with patient delay

Distance to primary healthcare center	Pearson Correlation	.188*
	Sig. (2-tailed)	.022
Distance to tertiary healthcare centre	Pearson Correlation	-.006
	Sig. (2-tailed)	.939
Age Group	Pearson Correlation	.269**
	Sig. (2-tailed)	.001
Gender	Pearson Correlation	-.068
	Sig. (2-tailed)	.413
Educational level of father	Pearson Correlation	-.180*
	Sig. (2-tailed)	.029
Educational level of mother	Pearson Correlation	-.064
	Sig. (2-tailed)	.444
Complementary and Alternative Medicines	Pearson Correlation	.274**
	Sig. (2-tailed)	.001
Parental perception regarding usefulness of treatment of malignancy	Pearson Correlation	-.318**
	Sig. (2-tailed)	.000
Financial problems for treatment	Pearson Correlation	-.171*
	Sig. (2-tailed)	.039

Table-II. Factors associated with physician delay

Begum et al from Bangladesh have reported that more than 2/3rd of their patients had <30 days of physician delay.¹⁴ In Turkey, Cecen et al found mean physician delay of 28 days in their study

of 329 children.²¹ Other studies from Kenya and Uganda have reported mean physician delays of 2 and 2.6 weeks respectively.⁷ Comparison with other studies from developing countries signifies that our health care system is not well equipped to promptly handle malignant diseases in children. Hospital in smaller towns and remote areas lack trained medical professionals and facilities for diagnostic investigations. Parents have to take their children to tertiary care centers in large cities.

Age in years	Pearson Correlation	.122
	Sig. (2-tailed)	.143
Gender	Pearson Correlation	-.139
	Sig. (2-tailed)	.093
Financial problems for treatment	Pearson Correlation	-.059
	Sig. (2-tailed)	.477
Educational level of father	Pearson Correlation	.093
	Sig. (2-tailed)	.264
Educational level of mother	Pearson Correlation	-.028
	Sig. (2-tailed)	.734
Distance to primary healthcare center	Pearson Correlation	.079
	Sig. (2-tailed)	.343
Distance to tertiary healthcare centre	Pearson Correlation	-.097
	Sig. (2-tailed)	.243
Treatment by Hakeem/homeopath/faith healer	Pearson Correlation	.131
	Sig. (2-tailed)	.114
Parental perception regarding usefulness of treatment of malignancy	Pearson Correlation	-.101
	Sig. (2-tailed)	.222

Table-III. Factors associated with treatment delay

	Frequency	Percent	Valid Percent	Cumulative Percent
< 30 days	27	18.4	18.4	18.4
31-60 days	51	34.7	34.7	53.1
61-90 days	18	12.2	12.2	65.3
> 90 days	51	34.7	34.7	100.0
Total	147	100.0	100.0	

Table-IV. Total delay from onset of disease to start of treatment

Limited financial resources and lack of awareness about effective treatment of malignant disorders results in visits to complementary and alternative

therapies. Treatment by alternate measures (herbal medicines, homeopathy or spiritual healers) results in further delay. Sixty five percent of our patients had alternate therapy before definitive medical treatment. Complementary and alternative medicine (CAM) is being used in other underdeveloped countries also. Aliyu et al from Nigeria have reported 66% patients having used CAM without informing treating physicians.⁹ There are many studies from developed countries about use of alternative therapies. Sanchez et al have found 30% oncology patients to use CAM in Mississippi USA whereas Singendonk et al from Netherland have reported 42% prevalence of CAM in children having malignancies.^{10,11}

Most of modifiable factors associated with three categories of delay were common including financial problems, increased distance of well equipped healthcare centers from home town and illiteracy or lower education level of parents. Children are under care of their parents, which underscores the importance of parents' knowledge, attitudes, and behavior in the cancer diagnosis pathway. Mothers' education was related to shorter patient delay whereas fathers' education was related more significantly to physician or treatment delay. It signifies the fact that educated mothers are more observant and concerned about symptoms related to serious diseases whereas educated fathers are more sensitized or resourceful in having timely investigation and treatment. Parental education and socioeconomic level are closely related. Various studies have found that educated parents have better socioeconomic status and can afford treatment in private hospitals where clinical evaluation and diagnostic procedures are done at rapid pace as compared to public sector hospitals.^{12,13}

Apart from formal education, parents' perception and knowledge about usefulness of medical treatment in cases of cancer also played a significant role in seeking treatment more promptly. Other studies from developing countries have also mentioned similar results^{12,14}

Patient delay was significantly short in younger

patients (Figure-2). They may experience malignancy with more identifiable signs at onset as compared to older children. Younger age has been the most consistent factor associated with early presentation in studies from different countries.¹⁵⁻²⁰ Pollock et al, in a large cohort of 2665 children, found that for all solid tumors except Hodgkin's disease, time delay in diagnosis increased with age. In young children, the aggressive nature of their malignancies may lead to the rapid appearance of symptoms, which shortens the diagnostic delay period.¹⁵

In our study female gender was not significantly associated with delay. This finding is consistent with some other reports in the literature. Saha et al from United Kingdom found no significant difference in the lag time between males and females.¹⁶ Abdelkhalek et al from Egypt have reported similar finding.¹² Begum et al however, have reported a significant correlation between female gender and delayed treatment in Bangladeshi children.¹⁴

As seen in other studies, type of cancer affects time lag to diagnosis. Acute leukemia and Wilms' tumor were associated with early presentation and Hodgkin lymphoma and brain tumors have been associated with longer delays in presentation and diagnosis.⁵

Our study has certain limitations. It was a small sized, single-center study. Recall bias is a concern, particularly when addressing the beginning of symptoms. Large multicenter studies and national cancer registry are needed to get more comprehensive and reliable information.

CONCLUSION

Significantly long physician delay is caused by lack of medical facilities in smaller towns, family's socioeconomic status, parental education and perception about usefulness of medical treatment. Better training of medical professionals and improvement in diagnostic facilities in smaller cities can result in reduced time lag before definite treatment. Efforts should be made to promote public and parental awareness about childhood malignancies and benefit of timely management.

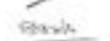
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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
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2	Shoaib Ahmed	Writing.	
3	Saman Tanveer	Data collection, Analysis.	