SHORT COMMUNICATION

Socio-demographic characteristics of children and young people with primary brain tumours: comparison between a public and private sector tertiary hospital in Karachi, Pakistan

Faiza Urooj[1], Nida Zahid[2], Nick Brown[3], Russell Seth Martins[4], Thomas Martensson[5], Andreas Martensson[6], Ather Enam[7]

Abstract

Primary brain tumours (PBTs) are the commonest solid tumours in children and young people (CYP). A study was conducted at a private and a public sector hospital in Karachi, Pakistan, to determine the socio-demographic and tumour-related characteristics of CYP with PBTs between those presenting to the public and private hospitals. A total of 49 patients were included. The commonest PBT was pilocytic astrocytoma (29%). There were no differences in tumour-related characteristics between the two groups. However, parents of CYP with PBTs presenting to the public sector hospital were significantly less educated and had lower household incomes. No significant differences in age, gender, educational status, and ethnicity of CYP with PBTs were observed. Since CYP with PBTs presenting at the public sector hospital were from significantly lower socio-economic backgrounds and their parents were less educated, it suggests socio-economic disparities in PBT care for CYPs in Karachi, Pakistan.

Keywords: Paediatric brain tumour, Private sector, Public sector, Socio-demographics, Socio-economic.

DOI: https://doi.org/10.47391/JPMA.8502

Introduction

Central nervous system tumours are the most common solid tumours in children and young people (CYP) globally.[1,2] However, quality of and access to oncology care varies even in high income countries such as the United States with outcomes being associated with demographic and socio-economic factors.[3] In addition, public health insurance programmes also have demonstrable benefits on the quality of health care received.[4] In low- to middle-income countries (LMICs), socio-economic factors are a major source of inequities in healthcare access and outcomes.[5]

In Pakistan, a South Asian LMIC, and the sixth most populous country in the world, government budget for healthcare expenditure is approximately 5%.[6] Hospital healthcare services in Pakistan can be categorised as being public (i.e. government-owned) or private (i.e. non-government owned). The 2015-16 National Health Accounts (NHA) report shows that the private sector is predominantly utilised for healthcare services, accounting for approximately 85% of total health expenditure. Fifty-eight percent of the total health expenditures were in the form of out-of-pocket (OOP) expenditures, 1% were private voluntary health insurance contributions, and 35% was government spending on health.[6] The public sector hospitals in comparison are under-utilised; poor service, lack of availability of qualified staff, and a dearth of female healthcare workers were the most common reasons that hindered the public from using public health services.[7] Health-seeking behaviour and financing is strongly affected by socio-economic, cultural and educational backgrounds.[8] The study aimed to explore socio-demographic and tumour-related factors of CYP with primary brain tumours (PBT) presenting to private versus public tertiary care hospitals in Karachi, Pakistan.

Methods and Results

This study was conducted at the Aga Khan University Hospital (AKUH), a Joint Commission International Accreditation (JCIA-accredited) private tertiary care hospital, and Jinnah Postgraduate Medical Centre (JPMC), a public sector tertiary care hospital, in Karachi, Pakistan. The study was conducted from November 2020 to July 2022. The target population comprised newly diagnosed CYP with brain tumours, who had not yet received cancer treatment, presenting at the neurosurgery/oncology clinics at AKUH and JPMC from November 2020 to March 2022. Information was collected from the patients' parents using a structured questionnaire administered by the study team. Variables recorded included patients' socio-economic demographic variables, tumour-related factors, and parents' socio-demographic characteristics.

[1,2,7]Department of Surgery, Aga Khan University Hospital, Karachi, Pakistan, [3,5,6] Department of Women's and Children's Health, Uppsala University, Sweden, [4]Aga Khan University Hospital, Karachi, Pakistan.

Correspondence: Nida Zahid. Email: nida.zahid@aku.edu

ORCID ID. 0000-0001-8812-9463

Submission complete: 29-11-2022 **Review began**: 20-01-2023

Acceptance: 04-11-2023 **Review end:** 22-09-2023

Trained data collectors screened potential participants appearing for their scheduled clinic appointments for suitability of inclusion. If the patients fulfilled the eligibility criteria, written informed consent for participation in this study was obtained. For potential participants aged 5-18 years, parental consent and participant's assent was obtained. For potential participants aged > 18 years, only participant's consent was obtained. Strict privacy was maintained, with the questionnaire being administered in a separate room.

Ethical approval from the institutional review boards at Aga Khan University (ERC# 2020-4859-11855) and Jinnah Post Graduate Medical Centre (F2-81/2021-GENL/65706/JPMC) were obtained before starting the study.

Table 1 shows the socio-demographic data for a total of 49 patients recruited in the study; out of these 49, 30 (61%) were from the private and 19 (39%) from the public sector. The mean age of the patients was 13 ± 4.8 years at the private sector hospital and 12 ± 4.3 years at the public sector hospital. Most patients 36 (73%) lived in Sindh, with the greatest percentage 22 (45%) speaking Urdu as their first language. Parents of private hospital patients were

Table-1: Comparison of Socio-Demographic and Tumour Related factors of Brain Tumours in Children and Young People (5-21 years) and their parents presenting to private versus public tertiary care hospitals of Karachi, Pakistan.

Characteristics	Overall (N=49) n(%)	Site of Treatment Private (N=30)n (%)	Public (N=19)n (%)	p-Value
Socio-demographic factors				
Age (years) Mean ± SD	12.8 ± 4.6	13.3 ± 4.8	12 ± 4.3	0.3
Age				
5-10 years	17 (35)	10 (33)	7 (37)	0.1
11-14 years	12 (25)	6 (20)	6 (32)	
15-18 years	12 (25)	8 (27)	4 (21)	
> 18 years	8 (16)	6 (20.0)	2 (11)	
Gender				
Male	30 (61)	19 (63.3)	11 (58)	0.7
Female	19 (39)	11 (36.7)	8 (42)	
Province of Residence				
Sindh	36 (73)	20 (66.7)	16 (84)	0.6
Punjab	8 (16)	6 (20.0)	2 (11)	
KPK	4 (8)	3 (10.0)	1 (5)	
Gilgit Baltistan	1 (2)	1 (3.3)	0 (0)	
Mother tongue				
Sindhi	8 (16)	4 (13.3)	4 (21)	0.3
Urdu	22 (45)	11 (36.7)	11 (58)	
Pushto	5 (10)	3 (10.0)	2 (11)	
Punjabi	8 (16)	6 (20.0)	2 (11)	
Saraiki	5 (10)	5 (16.7)	0 (0)	
Others	1 (2)	1 (3.30)	0 (0)	

Continued on next column...

Continued from previous column..

Formal education				
Yes	43 (88)	28 (93)	15 (79)	0.2
No	6 (12)	2 (7)	4 (21)	
Years of education (In years) Median(IQR)				
	6 (1.5-9.5)	7 (2.7-10)	3 (1-7)	0.06
Age of mother (In years)				
	37.6 ± 6.57	39.6 ± 6.8	34.5 ± 4.9	0.007*
Mother Education				
Yes	37 (76)	24 (80)	13 (68)	0.5
No	12 (25)	6 (20)	6 (32)	
Mothers Education (any formal schooling years) Median (IQR)				
	8 (0.5 -12)	10(5-14)	5(0-12)	0.028*
Mother is currently working				
Yes	5 (10)	3 (10 %)	2 (11%)	>0.99
No	44 (90)	27 (90%)	17 (89%)	
Age of the father (in years) Mean ± SD				
		44.93 ± 8.34	38.84 ± 5.32	0.007*
Fathers Education				
Yes	39 (80%)	27 (90%)	12 (63%)	0.033**
No	10 (20%)	3 (10%)	7 (37%)	
Fathers Education (any formal schooling years) Median (IQR)				
	12 (5-14)	12(10-16)	8(0-10)	<0.001*
Father working				
Yes	42 (86%)	25 (83%)	17 (90%)	0.6
No	7 (14%)	5 (17%)	2 (10%)	
Household monthly income (PKR)				
	30000 (20000-80000)	80000 (20000-157500)	30000 (20000-30000)	0.018*
Household monthly income PKR				
<Rs 40,000	28 (57%)	12 (40%)	16 (84%)	0.004 *
Rs 40,000-80,000	10 (21%)	7 (23%)	3 (16%)	
>Rs 80,000	11 (21%)	11(37%)	0 (0.0%)	
Age at diagnosis of tumour (In years) Mean ± SD				
	12.53 ± 4.48	12.93 ± 4.63	11.89 ± 4.29	0.441
Tumour related Factors				
Brain tumour location				
Supratentorial	12 (25%)	8 (27%)	4 (21%)	0.7
Infratentorial/Posterior fossa	17 (35%)	11 (37%)	6 (32%)	
Seller	5 (10%)	3 (10%)	2 (11%)	
Supraseller	13 (27%)	8 (27%)	5 (26%)	
Suprasellar, Sellar and Parsellar	1 (2%)	0 (0%)	1 (5%)	
Suprasellar and sellar	1 (2%)	0 (0%)	1 (5%)	
Grade of the tumour				
Low Grade	28 (57%)	16 (62%)	12 (80%)	0.3
High Grade	13 (2%)	10 (39%)	3 (20%)	
Histopathology				
Diffuse Astrocytoma	2 (5%)	2 (8%)	0 (0%)	0.3
Ependymoma	3 (7%)	1 (4%)	2 (13 %)	
Craniopharyngioma	5 (12%)	2 (8%)	3 (20%)	
Anaplastic Astrocytoma	1 (2%)	1 (4%)	0 (0%)	
Pilocytic astrocytoma	12 (29%)	9 (35%)	3 (20%)	
Glioblastoma	4 (10%)	4 (15%)	0 (0%)	
Medulloblastoma	7 (17%)	4 (15%)	3 (20 %)	

Continued on next page...

Continued from previous page..

Pituitary adenoma	5 (12%)	2 (8%)	3 (20%)	
Optic chiasmatic tumour	2 (5%)	2 (4%)	0 (0 %)	
Choroid Plexus papilloma	1 (3%)	0 (0%)	1 (7%)	
Family history of brain tumour				
Yes	5 (10%)	3 (10%)	2 (11%)	>0.99
No	44 (90%)	27 (90%)	17 (89%)	
Family history of any other type of cancer				
Yes	11 (22%)	7 (23%)	4 (21%)	>0.999
No	38 (78%)	23 (77%)	15 (79%)	

*Significant at p value < 0.05 by using independent t test or Mann Whitney U test
**Significant at p value <0.05 by using chi-square or fisher exact test

significantly older and the fathers were significantly more likely to have received any formal education (90% vs 63%; p = 0.033). The household income of CYP with PBTs was also significantly greater for patients presenting to the private sector hospital. Overall, the PBTs were most commonly located in the posterior fossa/infratentorial 17 out of 49 (35%), with the most common PBTs being pilocytic astrocytoma 12 out of 42 (29%) and medulloblastoma 7 out 42 (17%). Only 5 out of 49 (10%) of CYP with PBTs had a family history of brain tumour. There were no significant differences regarding tumour-related factors between CYP from the private and public sector hospital.

Discussion

In this study no significant differences were observed between clinical and demographic features between the two hospitals. CYPs presenting to the public hospital were from lower socio-economic backgrounds, and their parents were less educated and younger. These results call attention to a potential concern. Public sector hospitals in Pakistan have poorer oncological services than private sector hospitals, including poorer diagnostic facilities, medication supplies, infrastructure, planning, and leadership,[9,10] which manifests downstream as poorer oncological outcomes.[11] Moreover, patient-reported outcomes and patient satisfaction is also higher in private sector hospitals.[12] Such differences between private and public sector hospitals have been demonstrated to some extent in other countries as well, such as South Africa and Australia.[13,14] Thus, given the pre-existing socio-economic disparities in healthcare access and utilisation,[15] the results of this study highlight an additional source of inequity in cancer outcomes even amongst patients who ultimately present to tertiary care facilities. It is important to introduce sustainable and inclusive development of healthcare services by the private corporate sector, in public-private partnership with the government to ensure better distribution of resources.[16] Achieving socio-economically equitable outcomes for CYP with PBTs in Pakistan requires across-the-board access to quality oncological and neurosurgical care. Although a universal health care coverage (UHC) programme has been initiated in Pakistan, establishment to-date has been very patchy.[17] In its current state, a UHC programme with mainly public sector coverage should be supported with concurrent investment in the structural facilities and oncologic care expertise in public sector hospitals. Other models of healthcare coverage, independent of government financing, have also been explored and suggested for uptake in Pakistan. These include public-private partnerships[18] and philanthropic funded healthcare models.[19] Nevertheless, these offer solutions only in the interim and definitive measures and must feature increased government involvement and investment in public sector healthcare.

Limitations: This study does not explore the impact of socio-demographic factors on disease outcomes; however, it is a step in that direction.

Conclusion

To conclude, no differences in tumour factors and demographic characteristics, such as age, gender, educational status, and ethnicity of CYP with PBTs were observed. However, CYP with PBTs from the public sector hospital were from significantly lower socio-economic backgrounds and their parents less educated, suggesting socio-economic disparities in PTB care for CYP in Karachi, Pakistan.

Ethical approval and consent to participate: The study protocol was approved by Aga Khan University's ethical review committee (ERC# 2020-4859-11855) and Jinnah Post Graduate Medical Centre's institutional review board (F2-81/2021-GENL/65706/JPMC). Consent was taken from the participants for participation.

Consent for publication: Consent was taken from the participants for publication.

Availability of data and materials: Data will be available upon request from the corresponding author.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: Faculty Development Award (FDA), Aga Khan University Karachi, Pakistan.

References

1. Udaka YT, Packer RJ. Paediatric Brain Tumours. Neurol Clin. 2018; 36:533–56. doi: 10.1016/j.ncl.2018.04.009.
2. Barnholtz-Sloan JS, Ostrom QT, Cote D. Epidemiology of Brain Tumours. Neurol Clin. 2018; 36:395-419. doi:

10.1016/j.ncl.2018.04.001.
3. Wilne S, Collier J, Kennedy C, Koller K, Grundy R, Walker D. Presentation of childhood CNS tumours: a systematic review and meta-analysis. Lancet Oncol. 2007; 8:685–95. doi: 10.1016/S1470-2045(07)70207-3.
4. Ostrom QT, Gittleman H, Xu J, Kromer C, Wolinsky Y, Kruchko C, et al. CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumours Diagnosed in the United States in 2009–2013. Neuro-Oncol. 2016; 18:v1-75. doi: 10.1093/neuonc/now207.
5. Louis DN, Perry A, Wesseling P, Brat DJ, Cree IA, Figarella-Branger D, et al. The 2021 WHO Classification of Tumours of the Central Nervous System: a summary. Neuro-Oncol. 2021; 23:1231-51. doi: 10.1093/neuonc/noab106.
6. Khalid F, Raza W, Hotchkiss DR, Soelaeman RH. Health services utilisation and out-of-pocket (OOP) expenditures in public and private facilities in Pakistan: an empirical analysis of the 2013–14 OOP health expenditure survey. BMC Health Serv Res. 2021; 21:178. doi: 10.1186/s12913-021-06170-4.
7. Anwar M, Green J, Norris P. Health-seeking behaviour in Pakistan: A narrative review of the existing literature. Public Health. 2012; 126:507–17. doi: 10.1016/j.puhe.2012.02.006.
8. Muhammad Malik A, Azam Syed S. Socio-economic determinants of household out-of-pocket payments on healthcare in Pakistan. Int J Equity Health. 2012; 11:51. doi: 10.1186/1475-9276-11-51.
9. Khokhar MA, Ali MM, Liaqat S, Moin A, Sarwar HA, Sarwar MZ. A review of access to cancer facilities in Punjab, Pakistan. [Online] [Cited 2022 May 30]. Available from: URL: https://onlinelibrary.wiley.com/doi/10.1002/cnr2.1245
10. Sarwar MR, Iftikhar S, Saqib A. Availability of anticancer medicines in public and private sectors, and their affordability by low, middle and high-income class patients in Pakistan. BMC Cancer. 2018; 18:14. doi: 10.1186/s12885-017-3980-3.
11. Irfan S, Ijaz A. Comparison of Service Quality between Private and Public Hospitals: Empirical Evidences From Pakistan. J Qual Technol Manag. 2011; 1:7.
12. Fayyaz R, Ahmed FA, Abid A, Akhtar A, Jarwar R, Jasmine A, et al. The quality of patient care in oncology departments in Karachi, Pakistan: patients' perceptions. Int J Health Care Qual Assur. 2020; 34:52-69.
13. Dell AJ, Klopper J. Surgical resources in South Africa: an analysis of the inequalities between the public and private sector. South Afr J Surg Suid-Afr Tydskr Vir Chir. 2018; 56:16-20.
14. To YH, Shapiro J, Wong R, Thomson B, Nagrial A, Mendis S, et al. Treatment and outcomes of unresectable and metastatic pancreatic cancer treated in public and private Australian hospitals. Asia Pac J Clin Oncol. 2022; 18:448-55.doi: 10.1111/ajco.13721
15. Zhao Y, Zhang L, Fu Y, Wang M, Zhang L. Socio-economic Disparities in Cancer Treatment, Service Utilisation and Catastrophic Health Expenditure in China: A Cross-Sectional Analysis. Int J Environ Res Public Health. 2020; 17:1327. doi: 10.3390/ijerph17041327.
16. Medhekar A. Public-private Partnerships for Inclusive Development: Role of Private Corporate Sector in Provision of Healthcare Services. Procedia Soc Behav Sci. 2014; 157:33–44.
17. Farooq M, Arshad MI, Usman M. Towards universal health coverage in Pakistan: Challenges ahead. Lancet Reg Health Southeast Asia. 2022; 1:100003. doi: 10.1016/j.lansea.2022.03.003.
18. Farooq W, Shaikh HS, Anwar S, Punjwani R, Raza MR. Achievements and pitfalls in improving Paediatric Oncology Nursing standards: A public-private partnership project. Can Oncol Nurs J Rev Can Nurs Oncol. 2022; 32:319–21.
19. Kassim-Lakha S, Bennett J. Philanthropic funding for health in Pakistan. Lancet Lond Engl. 2013;381:2236–7.

Author's Contributions
FU and RSM: Drafting, critical revision.
NZ: Analysed data and critical revision.
NB and SAE: Conceived the idea and critical revision.
TM and AM: Study design critical revision.