

Original Research Article

Epidemiological, clinical and histopathological features of meningiomas in a tertiary care hospital

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ABSTRACT

Background: Meningiomas are the second most common primary tumors of the central nervous system. These tumors have an inherited tendency to progress and recur. These tumors are more common in females. The aim of this study was to observe the epidemiological, clinical and histopathological features of meningiomas in a tertiary care hospital.

Methods: This observational study was conducted at the Pathology Department of the Postgraduate Medical Institute (PGMI) Lahore, Pakistan, from January 2013 to December 2013. The cases were collected from the Pathology Laboratory of the Lahore General Hospital, Lahore. This study was conducted on 50 cases of histologically diagnosed meningiomas. The sample size was calculated using 15% expected prevalence of meningiomas at 95% confidence interval and 10% level of precision. Data was entered and analyzed using SPSS version 17.

Results: There were 22 (44%) male and 28 (56%) female patients in this study. The mean age of patients was 47.28 ± 14.71 years with the median age 47 years. The minimum and maximum ages were 18 and 75 years and age range was 57 years. Out of 50 cases, forty two cases were diagnosed as benign meningiomas (WHO Grade-I). Six cases were of atypical meningiomas (WHO grade II). Two cases were diagnosed as anaplastic meningiomas (WHO grade III).

Conclusions: It can be concluded from the findings of present study that meningiomas are more common in females than males with grade I meningiomas outnumber the grade II and grade III meningiomas.

Keywords: Meningiomas, Histological grades, Atypical meningiomas

INTRODUCTION

The tumors of the CNS may originate in the brain or spinal cord (primary tumors) or may spread to the brain from another site of cancer (metastatic tumors).¹ The annual incidence of tumors of the CNS ranges from 10-17 per 100,000 persons for intracranial tumors and 1-2 per 100,000 persons for intraspinal tumors.² The incidence of CNS tumor in northern Pakistan is 2.03% and male to female ratio is 2.3:1.³

Seventy percent childhood CNS tumors arise in posterior cranial fossa.⁴ The incidence in pediatric age group in northern Pakistan is about 15%.³ Primary brain tumors are approximately 2% of all the body tumors.³ Neuroepithelial tumors form the majority of CNS lesions.⁵ Gliomas constitute approximately 50% of all the brain tumors.⁶

The second most common primary tumors of the central nervous system which arise from the meningiothelial

cells of arachnoid are called meningiomas.⁷ The prevalence of meningiomas is 9-27% of the primary brain tumors in Pakistan.⁸ These tumors are usually benign but can be malignant.

Spinal meningiomas show a female preponderance of as high as 9:1 in some series. Meningiomas occur in adults between the ages of 20-40 years with the peak incidence of 65 years. Some of the cases are familial while most are sporadic. Rapid growth of meningiomas in pregnant women has also been well documented.⁹ These increases suggest that the more widespread use of hormonal contraceptives may contribute to the tumorigenesis of meningiomas. The etiology of meningiomas is not exactly known, although several risk factors have been described, such as ionising radiation, head injury, hormones and genetic factors.¹⁰

Neurological symptoms are produced by compression of adjacent structures. Headache and seizures are common but nonspecific symptoms.¹¹ Most meningiomas follow a benign clinical course, but a subset cause neurological deficits, relentlessly recur, or may even kill the patient. Roughly 80% of meningiomas are considered WHO grade 1 (benign) tumors and have a recurrence rate of 7-25% with GTR (grand total resection). WHO grade II (atypical) meningiomas constitute 15-20% and have a recurrence rate of 29-52% even after GTR, whereas WHO grade III- (anaplastic) meningiomas account for 1-2% of cases and have a recurrence rate of 50-94% and are associated with high mortality rates.

On neuroradiologic and gross assessment, the typical meningioma is a lobulated, solid, mass that is attached to the dura mater. Although most of the meningiomas are benign, they can be atypical as well as anaplastic. Classification of meningiomas is based upon the WHO classification system.¹²

WHO grade I meningiomas have been reported to have significantly higher incidences of estrogen, progesterone, and androgen receptors than higher-grade meningiomas. However, differences in sex hormone receptor expression alone may not explain the observed increase in incidence in women.¹³

It is suggested that meningiomas are hormone sensitive tumors because of its increased incidence in females as compared to males, increased growth during pregnancy and menses, increased incidence in patients having breast cancer and increased incidence in patients having lymphangio-leiomyomatosis.¹⁵ Considering this background reported data, this was aimed to observe the epidemiological, clinical and histopathological features of meningiomas in a tertiary care hospital.¹³⁻¹⁵

METHODS

This study was an observational study conducted at the Pathology Department of the BAMDC Lahore, Pakistan.

The cases were received at and collected from the Pathology Laboratory of the Lahore General Hospital, Lahore, from January 2013 to December 2013. This study was conducted on 50 cases of histologically diagnosed meningiomas. Sampling technique was convenient sampling. Written informed consent was taken on a consent proforma. Patients of all ages and both sexes diagnosed histologically as meningiomas were included in this study. While exclusion criteria was patients with recurrent meningiomas, patients who were already receiving the treatment for meningiomas, patients with immunological disorders and patients on hormone replacement therapy.

Hematoxylin and Eosin staining of the sections was done as per standard protocol.¹⁶ Histopathological evaluation was performed by two pathologists, using hematoxylin and eosin-stained sections. All the data was entered and analysed using SPSS 20.0. A p value of ≥ 0.05 was taken as statistically significant. This study was approved by Advanced Studies and Research Board of University of Health Sciences, Lahore, Pakistan.

RESULTS

Table 1 and 2 show the descriptive statistics of age (years) in 50 cases of meningiomas. In this study the mean age of patients was 47.28 ± 14.71 years with the median age 47 years. The minimum and maximum ages were 18 and 75 years and age range was 57 years.

Table 1: Age related findings of the study subjects.

	Mean	47.28
	Median	47.00
	Std. deviation	14.71
Age (years)	Range	57.00
	Minimum	18.00
	Maximum	75.00

Table 2: Comparison of age (years) in males and females.

	Male	Female	Total
N	22	28	50
Mean	48.23	46.53	47.28
Std. deviation	17.10	12.82	14.71
Minimum	18.00	21.00	18.00
Maximum	75.00	75.00	75.00

P value=0.691.

Figure 1 shows the age distribution of 50 cases of meningiomas. There were 7 (14%) patients who were in 18-29 years age, 20 (40%) patients were 30-49 years old, and 18 (36%) patients were 50-69 years of age and 5 (10%) were 70-79 years of age. Figure 2 shows the gender distribution. There were 22 (44%) male and 28 (56%) female patients in this study.

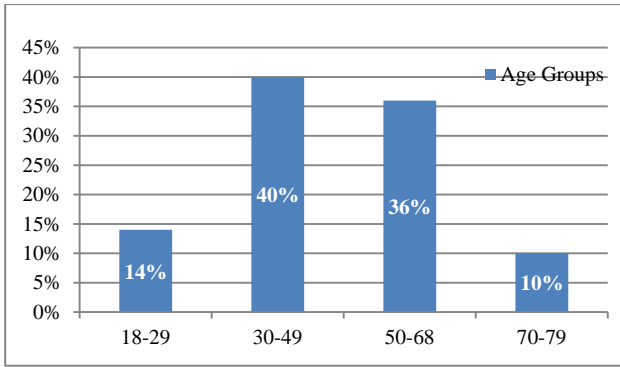


Figure 1: Age distribution in 50 cases.

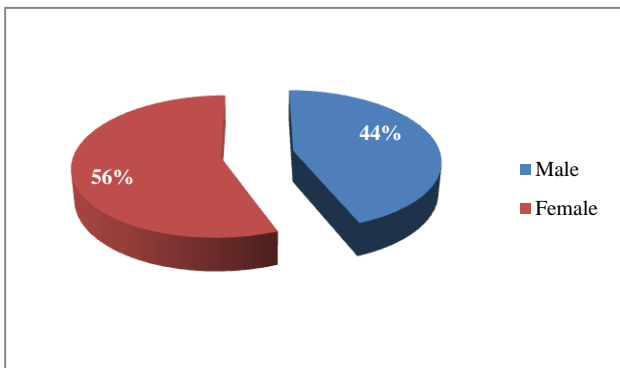


Figure 2: Gender distribution in study subjects.

Table 3: Frequency table of site of tumor.

	Frequency	Percentage (%)
Left frontal region	10	18.0
Right frontal region	8	16.0
Left parietal region	5	10.0
Right parietal region	2	4.0
Right temporal	4	8.0
Left temporal	3	6.0
Others	19	38.0
Total	50	100.0

Frequency of different sites of meningiomas is shown in Table 3. There were 9 (18%) patients who had left frontal region, 8 (16%) had right frontal region, 5 (10%) had left parietal region, 5 (10%) had right parietal region and 2

(4%) patients had right temporal. There were 4 who (8%) had left temporal and rest of 19 (38%) patients had other site of tumor.

Table 4: Frequency of different types of meningiomas.

	Frequency	%
Meningiothelial meningioma	22	44
Psammomatous meningioma	21	42
Clear cell meningioma	5	10
Rhabdoid meningioma	2	4
Total	50	100

Table 4 shows the frequency of different types of meningiomas. There were 22 (10%) patients who were diagnosed as meningiothelial meningiomas, psammomatous meningiomas were seen in 25 (50%), 5 (10%) patients had clear cell meningiomas and rhabdoid meningiomas were seen in 2 (4%) of the patients.

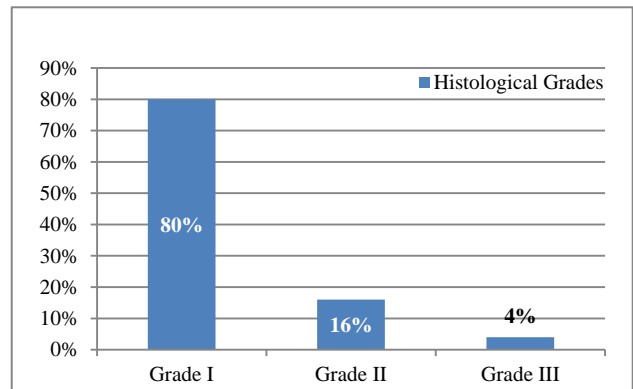


Figure 3: Histological grades.

Histological grades of tumors were also assessed and grade-I was seen in 40 (80%), grade II was present in 8 (16%) and grade III was seen in 2 (4%) as shown in figure 3. Table 5 shows the comparison of histological grades in both males and females. Grade 1 was seen in 15 males (68.9%) and 25 females (89.3%). Grade 2 was seen in 6 males (27.3%) and 2 females (7.1%). Grade 3 was seen in 1 male (4.5%) and 1 female (3.1%). There was no statistical difference of histological difference in both male and female patients, p=0.146 (in significant difference).

Table 5: Comparison of histological grades in male and females.

		Gender		Total
		Male	Female	
		N (%)	N (%)	
Histological grades	Grade-I	15 (68.2)	25 (89.3)	40 (80.0)
	Grade-II	6 (27.3)	2 (7.1)	8 (16.0)
	Grade-III	1 (4.5)	1 (3.6)	2 (4.0)
Total		22 (100.0)	28 (100.0)	50 (100.0)

P value=0.146 (insignificant difference).

DISCUSSION

Meningiomas are the most common primary intracranial tumor accounting for over one third of all brain tumors.¹⁷ Most meningioma are WHO grade I tumors and can be treated effectively with surgery, however, a subset have more aggressive features. Over 20% of meningiomas are WHO grade II (atypical) tumors and approximately 3% are WHO grade III (anaplastic) meningioma.^{18,19} Patients with WHO grade II or III meningiomas are significantly more likely to have a local recurrence after their initial treatment and moreover have a shorter overall survival compared to patients with WHO grade I meningioma.²⁰

In this study meningiomas occurred mostly in the 5th and 6th decades (28% each) of life and then subsequently in the 4th decade (12%), 8th decade (10%), 3rd decade (10%), 7th decade (8%) and in 2nd decade (4%).

The mean age at surgery or the diagnosis of benign, atypical and malignant meningiomas were correlated well with other studies done by Taghipour et al, Thomas backer- grondahl et al, Arlete et al and Telungu et al.²¹⁻²⁴

A study done by from Pakistan stated that intracranial brain neoplasms have mostly occurred in 3rd and sixth decades of life, which coincides with this study.⁴

The age of occurrence of grade III meningiomas were slightly lower in the present study than that depicted in the other studies. Some studies suggested that the prevalence of atypical and malignant meningiomas were high among males.^{25,26} But the current study did not correlate with these findings and there was a higher female prevalence among benign meningiomas whereas the prevalence was equal among male and female cases among high grade meningiomas. There were no association between the grade or behaviour of the tumour and the site or the age of occurrence of meningiomas as described in the above said studies.

In our study, out of 50 cases of meningiomas, 28 were females and 22 were males. In this study the mean age of patients was 47.28±14.71 years with the median age 47 years which is close to the mean age mentioned in study done by Hsu et al. in 1997.²⁷ Out of 50 cases of meningiomas, 40 were of grade I, 8 cases were of grade II whereas 2 cases were of grade III. So we came to know that Grade I meningiomas are most common, then grade two, and lastly grade three as evidenced by Metellus et al in 2008 and Omulecka et al in 2006.^{28,29}

CONCLUSION

We can conclude from the findings of present study that meningiomas are more common in females than males with peak incidence in 5th and 6th decades of life. Also Grade I meningiomas are more common than Grade II and Grade III meningiomas. It is also noted that frontal

region is most commonly involved site in case of intracranial meningiomas.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Nassehi D. Intracranial meningiomas, the VEGF-A pathway, and peritumoral brain oedema. *Dan Med J*. 2013;60(4):4626.
2. Frosh PM, Anthony CD, Girolami UD. The central nervous system. In: Kumar V, Abbas AK, Fausto N, Aster JC, eds. *Robbins and Cotran Pathological Basis of diseases*. 8th Ed. Philadelphia: Elsevier, 2010: 1279-1343.
3. Jamal S, Mamoon N, Mushtaq S, Luqman M. Pattern of central nervous system (CNS) tumors: a study of 430 cases. *Pak J Pathol*. 2005;16(4):106-9.
4. Ahmed Z, Muzaffar S, Kayani N, Pervez S, Husainy AS, Hassan SH. Histological pattern of central nervous system neoplasms. *JPM*. 2001;51(4):154-7.
5. Marosi C, Hassler M, Roessler K, Reni M, Sant M, Mazza E, et al. Meningioma. *Crit Rev Oncol Hematol*. 2008;67:153-71.
6. Khalid H, Shibata S, Kishikawa M, Yasunaga A, Iseki M, Hiura T. Immunohistochemical analysis of Progesterone receptor and Ki - 67 labeling index in astrocytic tumors. *Cancer*. 1997;80(11):2133-40.
7. Aarhus M, Lund-Johansen M, Knappskog PM. Gene expression profiling of meningiomas: current status after a decade of microarray-based transcriptomic studies. *Acta Neurochir*. 2011;153(3):447-56.
8. Ahmed Z, Azad NS, Bhurgari Y, Ahmed R, Kayani N, Pervez S, et al. Significance of Immunohistochemistry in accurate characterization of malignant tumors. *J Ayub Med Coll Abbottabad*. 2006;18(2):38-43.
9. Saitoh Y, Oku Y, Izumoto S, Go J. Rapid growth of a meningioma during pregnancy: relationship with estrogen and progesterone receptors-case report. *Neurol Med Chir (Tokyo)*. 1989;29(5):440-3.
10. Alexiou GA, Markoula S, Gogou P, Kyritsis AP. Genetic and molecular alterations in meningiomas. *Clinical Neurol Neurosurg*. 2011;113(4):261-7.
11. Fung KM. *Meningiomas Pathology*. Medscape reference, 2012.
12. Wrobel G, Roerig P, Kokocinski F, Neben K, Hahn M, Reifenberger G, et al. Microarray-based gene expression profiling of benign, atypical and anaplastic meningiomas identifies novel genes associated with meningioma progression. *Int J Cancer*. 2005;114(2):249-56.
13. Korhonen K, Raitanen J, Isola J, Haapasalo H, Salminen T, Auvinen A. Exogenous sex hormone use and risk of meningioma: a population-based

- case-control study in Finland. *Cancer Causes Control*. 2010;21(12):2149-56.
14. Claus EB, Calvocoressi L, Bondy ML, Wrensch M, Wiemels JL, Schildkraut JM. Exogenous hormone use, reproductive factors, and risk of intracranial meningioma in females. *J Neurosurg*. 2013;118(3):649-56.
 15. Kubo M, Fukutomi T, Akashi S, Hasegawa T. Association of Breast Cancer with Meningioma: Report of a Case and Review of the Literature. *Jpn J Clin Oncol*. 2001;31(10):510-3.
 16. Gamble M. The Hematoxylin and Eosin. In: Bancraft JD, Gamble M, eds, 2008. *Theory and practice of histological techniques*. 6th Ed. New York: Churchill Livingstone; 2008: 121-135.
 17. Ostrom QT, Gittleman H, Farah P, Ondracek A, Chen Y, Wolinsky Y, et al. CBTRUS statistical report: Primary brain and central nervous system tumors diagnosed in the United States in 2006-2010. *Neuro Oncol*. 2013;15(2):1-56.
 18. Pearson BE, Markert JM, Fisher WS, Guthrie BL, Fiveash JB, Palmer CA, et al. Hitting a moving target: evolution of a treatment paradigm for atypical meningiomas amid changing diagnostic criteria. *Neurosurg Focus*. 2008;24(5):3.
 19. Claus EB, Bondy ML, Schildkraut JM, Wiemels JL, Wrensch M, Black PM. Epidemiology of intracranial meningioma. *Neurosurgery*. 2005;57(6):1088-95.
 20. Kaur G, Sayegh ET, Larson A, Bloch O, Madden M, Sun MZ, Barani IJ, James CD, Parsa AT. Adjuvant radiotherapy for atypical and malignant meningiomas: a systematic review. *Neuro Oncol*. 2014;16(5):628-36.
 21. Thomas Backer-Grondahl, Bjornar H Moen, Sverre H Torp. The histopathological spectrum of human meningiomas. *Int J Clin Exp Pathol*. 2012;5(3):231-42.
 22. Taghipour M, Rakei SM, Monabati A, Nahavandi-Nejad M. The role of estrogen and progesterone receptors in grading of the malignancy of meningioma. *Iranian Red Crescent Med J*. 2007;9(1):17-21.
 23. Hilbig A, Maria L, Barbosa-Coutinho. Meningiomas and hormonal receptors- Immunohistochemical study in typical and nontypical tumours. *Arq Neuropsiquiatr*. 1998;56(2):193-9.
 24. Telugu RB, Chowhan AK, Rukmangadha N, Patnayak R. Histopathological and immunohistochemical evaluation of meningiomas with Reference to Proliferative Markers p53 and Ki-67. *J Clin Diagnos Res*. 2016;10(1):15-9.
 25. Norden AD, Drappatz J, Wen PY. Targeted drug therapy for meningiomas. *Neurosurg Focus* 2007;23(4):12.
 26. Fewings PE, Battersby RDE, Timperley WR. Long-term follow up of progesterone receptor status in benign meningioma: a prognostic indicator of recurrence? *J Neurosurg*. 2000;92:401-5.
 27. Hsu DW, Efird JT, Hedley-Whyte ET. Progesterone and estrogen receptors in meningiomas: prognostic considerations. *J Neurosurg*. 1997;86(1):113-20.
 28. Metellus P, Nanni I, Dussert C, Trinkhaus M, Fuentes S, Chinot O, et al. Prognostic implications of biologic markers in intracranial meningiomas: 120 Cases. *Neurochirurgie*. 2008;54(6):750-6.
 29. Omulecka A, Papierz W, Nawrocka-Kunecka A, Lewy-Trenda I. Immuno-histochemical expression of progesterone and estrogen receptors in meningiomas. *Folia Neuropathol*. 2006;44(2):111-5.

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