

Clinical and Demographic Characteristics of Patients with Intracranial Meningiomas: A Descriptive Analysis

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ABSTRACT

Background: Intracranial meningiomas are common primary central nervous system tumors with variable clinical presentation and demographic distribution. Understanding their clinical and demographic profile is essential for early recognition and appropriate management. **Methods & Materials:** A cross-sectional study was conducted in the Department of Neurosurgery, National Institute of Neurosciences & Hospital (NINS&H), Agargaon, Dhaka, from April 2021 to September 2022 among 67 consecutive patients with radiologically and clinically diagnosed intracranial meningioma who underwent surgical treatment. **Results:** The majority of patients were in the 41–50 years age group (31.3%), followed by 31–40 years (23.9%) and 51–60 years (19.4%), with a mean age of 43.55±11.76 years (range 19–65 years). Females comprised 67% of cases, with a female-to-male ratio of 2:1. Headache was the most common presenting symptom (81.1%), followed by weakness (40.3%), visual disturbance (35.8%) and vomiting (11.9%). Neurological findings included motor signs in 40.3%, cranial nerve involvement in 38.8%, altered consciousness in 6%, aphasia/dysphasia in 9%, sensory signs in 9%, cerebellar signs in 4.5%, autonomic dysfunction in 7.5% and other signs in 7.5%. Convexity meningiomas were most frequent (34.3%), followed by falx/parasagittal (31.3%) and skull base lesions (25.4%), with sphenoid wing being the most common skull base subtype. **Conclusion:** Intracranial meningiomas predominantly affect middle-aged females and most commonly present with headache and focal neurological deficits. Convexity and parasagittal regions are the most frequent tumor locations. These findings highlight characteristic clinical and demographic patterns that may aid early diagnosis and management.

Keywords: Intracranial meningioma, clinical profile, demographic characteristics, neurological findings, tumor location.

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INTRODUCTION

Intracranial meningiomas are among the most common primary central nervous system tumors, arising from the arachnoid cap cells of the meninges [1]. They are typically slow-growing, extra-axial lesions and account for a significant proportion of intracranial tumors encountered in neurosurgical practice [2]. Although often benign in nature, their clinical significance is largely determined by tumor size, location and associated mass effect on adjacent neural structures [3].

The demographic distribution of meningiomas shows a clear predilection for middle-aged and elderly individuals, with a marked female predominance, which has been attributed to hormonal influences [4]. Clinically, patients may present with a wide spectrum of symptoms depending on tumor location [5]. Common manifestations include persistent headache, seizures, focal neurological deficits, visual disturbances, cognitive changes and features of raised intracranial pressure. In some cases, incidental detection occurs during neuroimaging for unrelated complaints [6].

Diagnosis is primarily based on neuroimaging, with magnetic resonance imaging (MRI) playing a central role in defining tumor characteristics, anatomical relationships and surgical planning [7]. Despite advances in imaging techniques, histopathological examination remains the gold standard for

definitive diagnosis and grading [8]. The World Health Organization (WHO) classification system is widely used to categorize meningiomas into grades I, II and III based on histological features and biological behavior. Additionally, proliferative indices such as Ki-67 have been recognized as important markers for tumor aggressiveness and recurrence potential [9].

In many developing healthcare settings, intracranial meningiomas represent a significant neurosurgical burden due to increasing access to imaging and improved diagnostic capabilities [10,11]. However, comprehensive data describing the clinical presentation and demographic profile of affected patients remain limited. Understanding these patterns is essential for early recognition, timely intervention and improved patient outcomes [12].

Against this background, the present study aimed to describe the clinical and demographic characteristics of patients with intracranial meningiomas. By analyzing age distribution, sex predominance, presenting symptoms, neurological findings and tumor location, this study seeks to provide a clearer understanding of the disease pattern in a representative patient population. Such information may contribute to improved clinical awareness and more effective management strategies for intracranial meningiomas.

METHODS & MATERIALS

A cross-sectional study was conducted in the Department of Neurosurgery, National Institute of Neurosciences & Hospital (NINS&H), Agargaon, Dhaka, from April 2021 to September 2022. A total of 67 consecutive patients who were radiologically and clinically diagnosed with intracranial meningioma and underwent surgical treatment during the study period were included using purposive sampling. Patients were enrolled according to predefined inclusion and exclusion criteria and provided informed written consent before participation. Demographic characteristics including age and sex and clinical characteristics including presenting symptoms, neurological findings and tumor location were collected from clinical records and study data sheets. Histopathological confirmation of meningioma was obtained in all cases following surgical resection. Data were processed and analyzed using Statistical Package for Social Sciences

(SPSS) version 26.0. Descriptive statistics were used to summarize the data and the findings were presented as frequencies, percentages, tables and figures. Ethical approval was obtained from the Institutional Review Board of NINS&H (Memo No: IRB/NINS/2022/166) and confidentiality of participant information was maintained throughout the study.

RESULTS

Table I presents the age distribution of the 67 study subjects. The majority of patients (31.3%) belonged to the 41-50 years age group, followed by 23.9% in the 31-40 years group and 19.4% in the 51-60 years group. The mean age was 43.55 years. The youngest patient was 19 years old and the eldest was 65 years old.

Table I: Distribution of Study subjects (n=67) according to age (in years).

Age Group (Years)	Frequency	Percent (%)
1-10	0	0.0
11-20	3	4.5
21-30	9	13.4
31-40	16	23.9
41-50	21	31.3
51-60	13	19.4
61-70	5	7.5
Total	67	100.0

Mean $\pm$ SD = 43.55 $\pm$ 11.76 years; Range = 19-65 years.

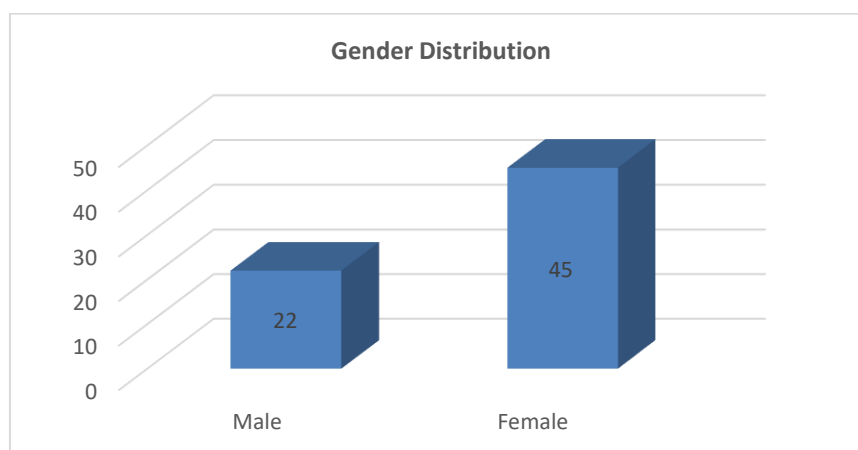


Figure 1: Bar chart showing distribution of study subjects according to gender.

Figure 1 shows the gender distribution of the study population. Of the 67 patients, 45 (67%) were female and 22 (33%) were male, yielding a female-to-male ratio of 2:1.

Table II shows the percentages of clinical complaints with which meningioma patients of the study presented. Most of

the patients 59 (81.1%) presented with headache. About 27 patients (40.3%) presented with weakness. Visual disturbance and vomiting was present in 35.8% and 11.9% of the patients respectively. In this frequency table, the respondents had multiple responses, e.g. if one patient had headache he or she might also have visual disturbance or paralysis.

Table II: Clinical Presentations of study population (n=67).

Symptoms	Frequency	Percent
Headache	59	81.1
Visual disturbance	24	35.8
Seizure	21	31.3
Weakness	27	40.3
Vomiting	8	11.9

Percentage was done on multiple responses.

Table III shows 4 patients (6%) had altered level of consciousness. Aphasia/ Dysphasia was present in 6 patients (9%). 26 patients (38.8%) suffered from cranial nerve impairment most of which were decreased visual acuity with fundoscopic findings followed by anosmia. 27 patients

(40.3%) had motor signs. Five patients (7.5%) suffered from autonomic dysfunctions, three patients (4.5%) had cerebellar signs including abnormal gaits. 6 patients (9%) had sensory signs and other signs (e.g. frontal lobe syndrome) were present in 5 patients (7.5%).

Table III: Distribution of study population (n= 67) according to neurological findings.

Signs	Frequency	Percent (%)
Altered level of consciousness	4	6
Aphasia/Dysphasia	6	9
Impaired Cranial Nerves	26	38.8
Motor Signs	27	40.3
Sensory Signs	6	9
Autonomic dysfunction	5	7.5
Cerebellar Signs and Gait	3	4.5
Signs of meningeal Irritation	0	0
Other signs	5	7.5

Multiple responses.



Figure 2: Distribution of study population according to location of the tumor.

The Figure 2 shows, 23 (34.3%) patients had convexity meningioma and 21 (31.3%) patients had falcine / parasagittal meningiomas. Among the 17 (25.4%) skull base meningiomas, sphenoid wing meningioma was commonest with 6 (9%) patients, followed by 3 (4.5%) olfactory groove and 3 (4.5%) planum sphenoidale meningioma patients. Among posterior fossa tumors, 2 were at cerebellopontine angle and 2 were petrous meningioma. 2 (3%) of the patients had falco- tentorial meningioma.

DISCUSSION

Intracranial meningiomas represent one of the most frequently encountered primary brain tumors and demonstrate distinct demographic and clinical characteristics. In the present study, the majority of patients were in the 41–50 years age group (31.3%), followed by 31–40 years (23.9%) and 51–60 years (19.4%), with a mean age of 43.55±11.76 years (range 19–65 years). A clear female predominance was observed, with 67% female and 33% male patients, yielding a female-to-male ratio of approximately 2:1. These findings are consistent with Baldi et al., who reported that meningiomas are more common in middle-aged females, likely due to hormonal influences [13]. Similarly, Walsh et al. described a

peak incidence in middle age with a female preponderance across most epidemiological studies [14].

The observed age distribution in this study aligns with findings from Lin et al., who demonstrated that intracranial meningiomas are most commonly diagnosed in adults between the fourth and sixth decades of life [15]. Brewster et al., also reported that demographic variations, including age at diagnosis, are influenced by biological and socioeconomic factors [16]. The predominance of middle-aged patients in our study (mean age 43.55 years) reflects a similar pattern seen in other regional studies, including Khalil et al., where most operated meningioma patients were within the productive age group [17].

Regarding clinical presentation, headache was the most common symptom in our study, affecting 81.1% of patients, followed by motor weakness in 40.3% and visual disturbance in 35.8%. These findings are comparable with Chowdhury et al., who reported headache as the most frequent neurological complaint in patients with intracranial pathology [18]. Fatema et al., also noted headache as a predominant presenting symptom in neuro-oncological patients in a tertiary care setting [19]. The high frequency of headache in our study likely reflects raised intracranial pressure or tumor-related mass

effect, as also described by Islim et al., in their review of symptomatic meningiomas [20].

Neurological deficits were also common in our cohort, with 40.3% presenting with motor signs, 38.8% with cranial nerve involvement, 9% with sensory deficits and 6% with altered consciousness. Similar neurological patterns have been described by Zhao et al., who emphasized that neurological deficits depend largely on tumor location and compression of adjacent brain structures [21]. Alam et al. also reported that anatomical location strongly influences neurological presentation in central nervous system tumors [22].

In terms of tumor location, convexity meningiomas were the most frequent (34.3%), followed by falcine/parasagittal lesions (31.3%) and skull base tumors (25.4%), with sphenoid wing being the most common skull base subtype. This distribution is consistent with global epidemiological data reported by Baldi et al. and Walsh et al., where convexity and parasagittal regions are commonly affected sites [13,14]. Similarly, Zhao et al. and Maiuri et al. noted that skull base meningiomas constitute a substantial proportion but are often associated with more complex surgical considerations [21,23].

The predominance of middle-aged females, headache as the leading symptom and convexity as the most common tumor location are consistent with established epidemiological trends. Studies by Laeke et al. and Khalil et al. in similar healthcare settings also reported comparable clinical patterns, reinforcing the generalizability of these findings [17,24]. Additionally, population-based analyses by Cao et al. and Holleczeck et al. further support the age and sex distribution observed in our study cohort [25,26].

LIMITATIONS

This study has several limitations. It was conducted on a relatively small sample size of 67 patients, which may limit the generalizability of the findings to the wider population. Being a single-center study, the results may also reflect institutional referral patterns and may not fully represent the national scenario.

CONCLUSION

Intracranial meningiomas showed a clear female predominance and were most commonly seen in middle-aged patients, with headache being the most frequent presenting symptom. Convexity tumors were the most common location, followed by falcine/parasagittal and skull base lesions. The study highlights consistent demographic and clinical patterns of intracranial meningiomas, which may assist in early clinical suspicion, timely diagnosis and appropriate neurosurgical management.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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