Pattern of Brain Tumor among Admitted Patients in a Specialized Center of Dhaka City: A Cross Sectional Study

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DECLARATION

I hereby declare that this thesis, entitled "Pattern of brain tumour among admitted patients in a specialized center of dhaka city: a cross sectional study" is based on my work and it contains no material previously published or written by another person and not accepted for the award of any other degree of a university or other institute of higher education.

This research work was carried out in the Department of Neurosurgery, National Institute of Neurosciences & Hospital, Sher e Banglanagar, Dhaka under the joint supervision of Dr. Mohammad Rafiqul Islam, Associate Professor, Department ofMathematics and Natural Sciences, BRAC University, Mohakhali, Dhaka.

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CERTIFICATE

This is to certify that Tangia Islam Tuly has completed the thesis entitled “Pattern of brain tumour among admitted patients in a specialized center of Dhaka city: a cross sectional study” as a partial fulfilment of the requirements for the degree of Master of Science in Biotechnology thesis part by the BRAC University Dhaka, Bangladesh. This study has been conducted in the Department of Neurosurgery, National Institute of Neurosciences, Dhaka.

Her work is original and the work is up to our full satisfaction.

_____

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ABBREVIATION

CP angle Tumor Cerebellopontine angle

CT scansComputed tomography

DALYs Disability adjusted life years

MRI Magnetic resonance imaging

PET CTPositron emission tomography Computed tomography

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ABSTRACT

A brain tumor is an intracranial solid neoplasm which involves varied types of cells. Management strategies and prognosis of tumor depends on the combination of factors like the type and grade of tumor, its location, size and state of development. In Bangladesh number of cancer cases increase in last decades with increase mortality and morbidity. It is estimated that there are around 800,000 cancer patients and around 150,000 die annually.Head neck/ Brain tumors constitute about 2-5% cases. Definite typing, grading of brain tumor by histological examination is essential for appropriate treatment. The overall objective of the study is to observe the frequency of different types of brain tumors among patients in a leading specialized center of Dhaka city.This cross-sectional study was carried out from November 2015 to January 2016 in National Institute of Neurosciences & Hospital, Dhaka, Bangladesh. A total of 220 cases were selected purposively during the study period irrespective of age and sex along with patients' clinical diagnoses, CT scan or MRI report, and operative findings and histological diagnosis were observed. This study also shows more frequency (75 study subjects) between the age of 40–49 years. Males are more likely to be diagnosed(56.6%) than females (43.4%).In urban 26.3% patients visits to doctor as per recommended and 52.6% patients visit to doctor only when attacks. In rural area 34.4% patients visit to doctor as per recommended and 44.4% patients visit to doctor only when attacks. Among male patients, 59.7% had WHO grade I, 33.9% had WHO grade II, 4.8% had WHO grade III and 1.6% had WHO grade IV severity of tumor. Whereasamong female patients, 58.3% had WHO grade I, 29.2% had WHO grade II, 9.4% had WHO grade III and 3.1% had WHO grade IV severity of tumor.Majority of the cases (150; 68.2%) had one surgery. More than twice surgeries were required among 10 (4.5%) cases. Craniotomy was done among 115 (52.3%) cases, Craniectomy was observed among 57 (25.9%) cases, Endoscopic removal of tumor was done in 48 (21.8%) cases. Minor complications observed in 135 (61.3%) cases, major complications were in 25 (11.4%) cases. pituitary cases were highest (122; 55.4% cases), frontal lobe tumors were 35 (15.9%) cases and parietal lobe tumors were in 40 (18.2%) cases. Brain tumors in adult arising in the frontal, temporal and parietal lobe collectively form the greatest proportion and majority (86%). Brain tumor in wide variety is present among all ages and sex. Proper policy, planning will reduce future disease burden.

Chapter: I

Introduction

1.1 Introduction

The brain is a soft, spongy mass of tissue. It is protected by the skull bones, meninges (three thin layers of tissues) and cerebrospinal fluid (watery fluid) that flows through spaces between the meninges and through ventricles (spaces in the brain) of the brain. A network of nerves carries messages back and forth between the brain and the rest of the body.Within the brain and spinal cord, glial cells (brain nerve cells) surround nerve cells and hold them in place.[1]A tumor is an abnormal mass of tissue, the growth of which is virtually autonomous and uncoordinated exceeds that of the surrounding normal tissues. Tumor is synonymous with neoplasm.[2]The World Health Organization (WHO) classifies neoplasms into four main groups: benign neoplasms, in situ neoplasms, malignant neoplasms and neoplasms of uncertain or unknown behavior.[3] Benign brain tumors do not contain cancer cells and can be removed, and the seldom grow back. Malignant brain tumors are generally more serious and often are a threat to life.Cancer is common term for malignant neoplasm.[2]

A brain tumor is an intracranial solid neoplasm which occurs not only in the brain, but also in lymphatic tissue, blood vessels, the cranial nerves, the brain envelopes (meninges), skull, pituitary gland, pineal gland and spinal canal.[4]Most primary brain tumors begin in glial cells. This type of tumor is called a glioma. Among adults, the most common types are: Astrocytoma (Tumor arises from star-shaped glial cells), Meningioma (Tumor arises in the meninges), Oligodendroglioma (Tumor arises from cells that make the fatty substance that covers and protects nerves).Among children, the most common types are: Medulloblastoma (Tumor usually arises in the cerebellum), Ependymoma (Tumor arises from cells that line the ventricles or the central canal of the spinal cord), Brain stem glioma (Tumor occurs in the lowest part of the brain) and Astrocytoma.[5]

The grade and stage of brain neoplasms provide a semi quantitative estimate of the clinical gravity of the tumor. Grading is based on the degree of differentiation and the number of mitoses within the tumor. Cancers are classified as grade I to IV with increasing differentiation of cells. In general, higher grade tumors are more aggressive than lower grade tumors. Staging is based on the anatomic extent of the tumor. Grading and staging of tumor are valuable for prognosis and planning theapy.[2, 5]

People exposed to ionizing radiation may have an increased risk of a brain tumor, such as meningioma or glioma. Several types of tumors run in the families like variants of CP angle

tumor. Excessive use of cell phones specially in children have increased risk of brain tumor. Patients having head injury or having been exposed to certain chemicals at work or to magnetic fields are important risk factors.[5]

Brain tumor patient's suffer from visual defect, vomiting, paralysis, seizures, cognitive impairment, and personality changes. It is the second most common cause of death from neurological disease, surpassed only by stroke.[6]

Computed tomography (CT) scans and especially magnetic resonance imaging (MRI) play acentral role in the diagnosis of brain tumor.[7] The definitive diagnosis can only be confirmed by histological examination of brain tissue samples obtained either by means of brain biopsy or open surgery.Histological examination is essential for the appropriate treatment and prognosis.[8]

In Bangladesh number of cancer cases increase in last decades with increase mortality and morbidity. It is estimated that there are around 800,000 cancer patients and around 150,000 die annually.[9]Head neck/ Brain tumors constitute about 2-5% cases.[10]Put the country in economic burden as well as having impact on individual assets. Treatment facilities also increase with the increase demand. The situation needs further understanding and future policy planning to reduce mortality, morbidity and economic burden of prevention, treatment and further rehabilitation. Current study observes types of brain tumors among admitted patients in a specialized center of Dhaka city with demographic characteristics, symptoms, family history, treatment etc.

1.2 Justification of the study

Following cardiovascular diseases and Diabetic complications cancer constitute major death and morbidity. In 2008, 7.6 million people died of cancer 13% of all deaths worldwide. Cancer is regarded as one of the major non communicable disease affecting south Asia, accounting for a large proportion of the DALYs (Disability adjusted life years). About 70% of all cancer deaths occur in low- and middle-income countries.Head neck tumor and brain tumor are among the list of high fatality of cancer.[11]The treatment cost is also high.

Non cancerous or benign tumors that are slowly growing and not likely to spread. Cancerous or malignant tumors that are more quickly growing and likely to spread into other areas of the brain.Central Brain Tumor Registry of the United States (CBTRUS) based on people who were treated between 1995 and 2010. Survival rates for brain and spinal cord tumors can vary widely by age, with younger people tending to better outlooks than older people. The survival rates are lower in 65 years or older.[12]Overall in England and Wales, for all types of cancerous brain tumors in adults, 40 out of 100 people diagnosed (40%) survive for one year or more after they are diagnosed. Around 20 out of every 100 people (20%) survive for 5 years or more after diagnosis. And around 15 out of every 100 people (15%) survive for 10 years or more after they are diagnosed.[13]

Current study observes types of brain tumors among admitted patients in a specialized center of Dhaka city with demographic characteristics, symptoms, family history, treatment etc. In our country there is no adequate study on this issue even in clinical and preventive fields. The results may help the policy makers for the decision making and planning where needed. It also help to develop desired treatment plan for the most common brain tumors. It also increase the field of research in biotechnology as well as other areas to improve the low cost treatment facility for the brain tumor patients. In other words, it may help to focus the area of brain tumor cases. It also help to provide special treatment package or subsidy by the Govt. in required treatment facility. It may also focus on future health insurance plan for the patients. It is an important indicator for the rehabilitation of the patients in the society, jobs etc.

1.3Objectives:

General Objectives:

The overall objective of the study is to observe the frequency of different types of brain tumors among patients in a leading specializedcenter of Dhaka city.

Specific Objectives:

1. To identify different types of brain tumors among patients irrespective of age and sex.

2. To observe the frequency of different types of brain tumors.

3. To observe different demographic variations among patients with brain tumors.

4.To observe different disease pattern among patients.

Chapter: II

Literature Review

Literature Review:

1. Brain:

The brain is a soft, spongy mass of tissue. It is protected by:

- The **bones** of the skull
- Three **thin layers of tissue** (meninges)
- **Watery fluid** (cerebrospinal fluid) that flows through spaces between the meninges and through spaces (ventricles) within the brain.

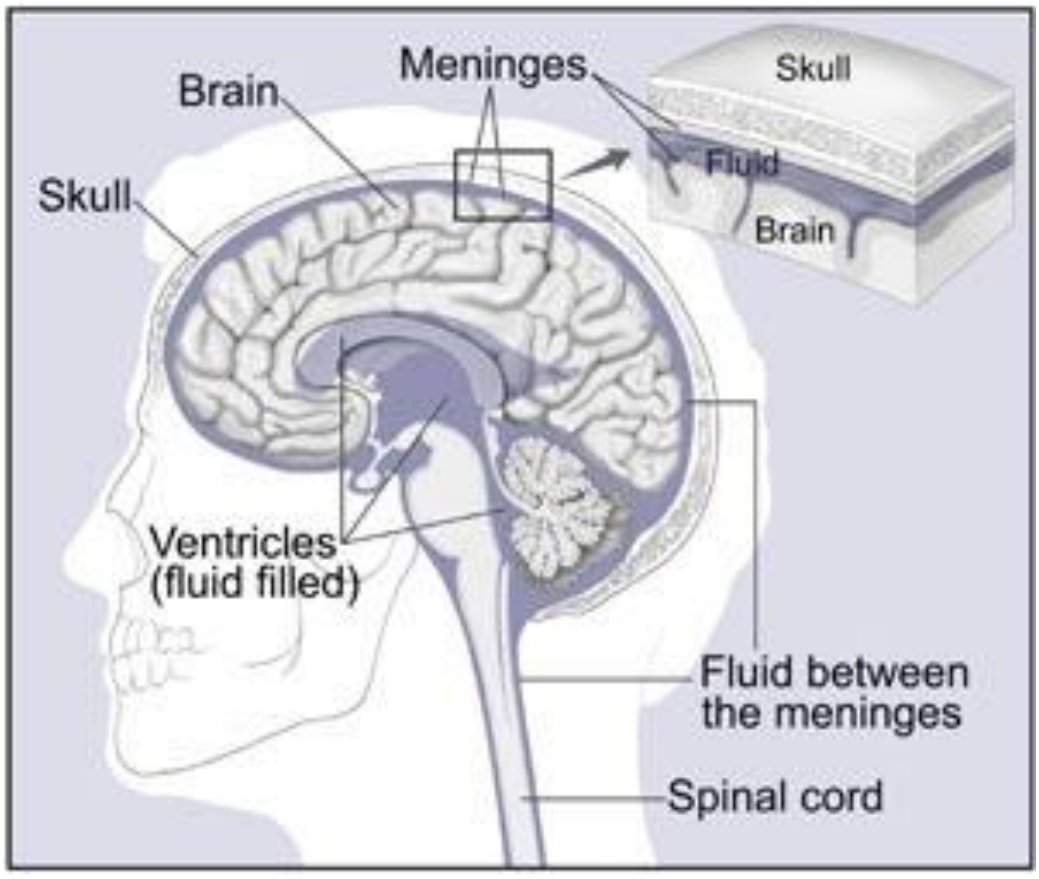

Fig 2.1.Hemisection of the head showing brain

Brain directs the things like walking and talking and the things our body does without thinking (like breathing). The brain is also in charge of our senses (sight, hearing, touch,

taste, and smell), memory, emotions, and personality.A network of nerves carries messages between the brain and the rest of the body. Some nerves go directly from the brain to the eyes, ears, and other parts of the head. Other nerves run through the spinal cord to connect the brain with the other parts of the body.The three major parts of the brain control different activities:

Cerebrum:The cerebrum uses information from our senses to tell us what is going on around us and tells our body how to respond. It controls reading, thinking, learning, speech, and emotions.The cerebrum is divided into the left and right cerebral hemispheres. The right hemisphere controls the muscles on the left side of the body. The left hemisphere controls the muscles on the right side of the body.

Cerebellum:The cerebellum controls balance for walking and standing, and other complex actions.

Brain stem:The brain stem connects the brain with the spinal cord. It controls breathing, body temperature, blood pressure, and other basic body functions. [1,14]

2. Brain Tumor

When most normal cells grow old or get damaged, they die, and new cells take their place. Sometimes, this process goes wrong. New cells form when the body doesn't need them, and old or damaged cells don't die as they should. The buildup of extra cells often forms a mass of tissue called a growth or tumor.A brain tumor is an intracranial solid neoplasm which involves varied types of cells. There are primary and secondary brain tumors. Primary brain tumors can be benign or malignant.

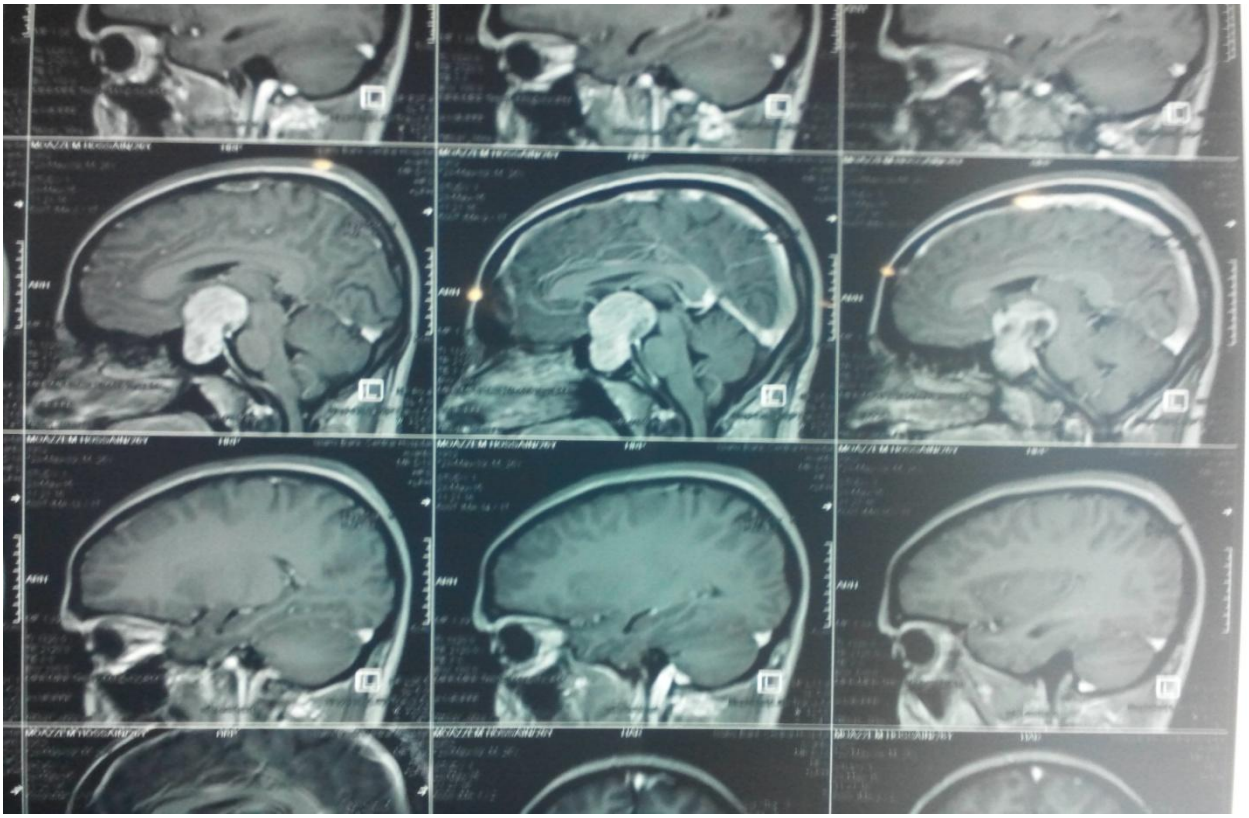

Fig 2.2: MRI showing brain Tumor

Benign brain tumors do not contain cancer cells:

- Usually, benign tumors can be removed surgically.
- Those rarely grow back.
- Benign brain tumors usually have an obvious border or edge.
- Cells from benign tumors rarely invade tissues around them.
- They don't spread to other parts of the body.
- Benign tumors can press on sensitive areas of the brain and cause serious health problems.
- Benign brain tumors may become malignant.

Malignant brain tumors (also called brain cancer) contain cancer cells:

- Malignant brain tumors are generally more serious and often are a threat to life.
- They are likely to grow rapidly and crowd or invade the nearby healthy brain tissue.
- Cancer cells may break away from malignant brain tumors and spread to other parts of the brain or to the spinal cord. [1,15]

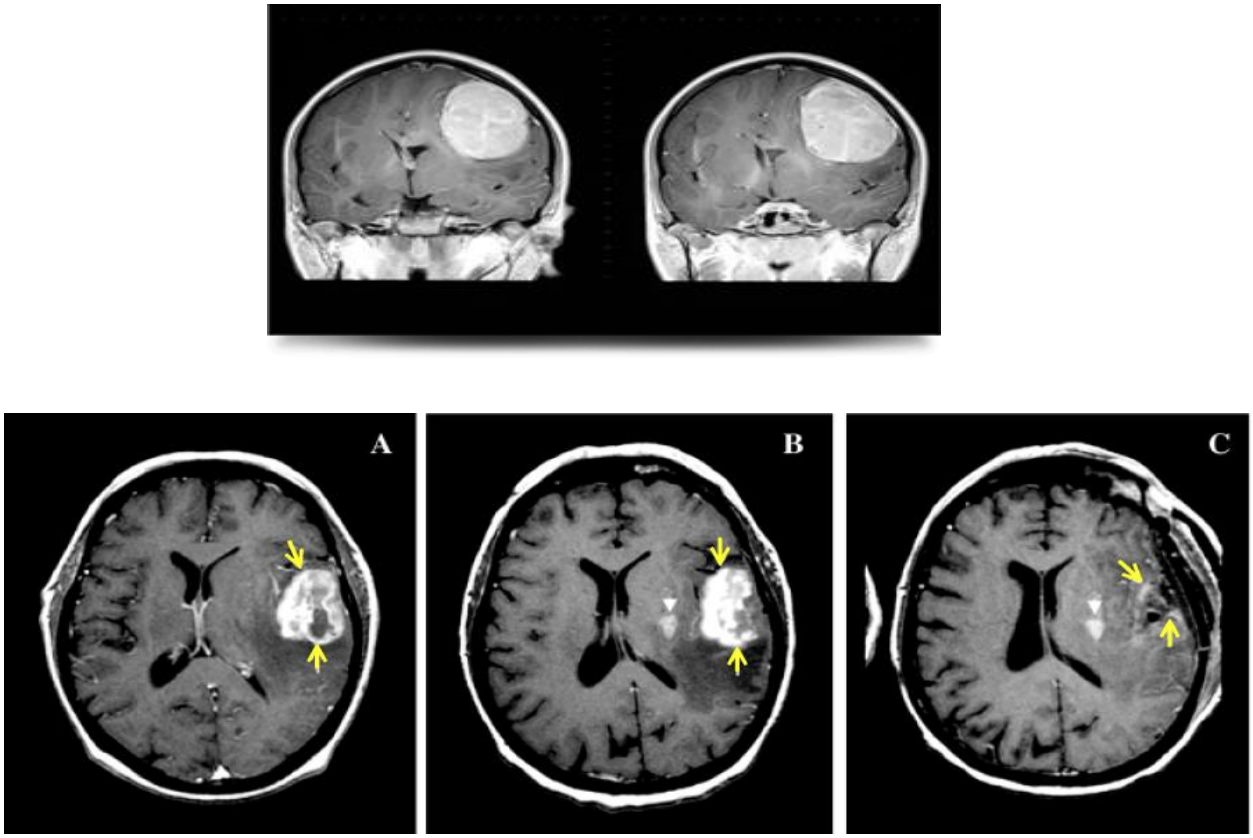

Fig 2.3: Malignant and benign tumor

3. Tumor grade

The grade of a tumor refers to the way the cells look under a microscope:

Grade I: The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

Grade II: The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumor.

Grade III: The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).

Grade IV: The malignant tissue has cells that look most abnormal and tend to grow quickly.

Cells from low-grade tumors (grades I and II) look more normal and generally grow more slowly than cells from high-grade tumors (grades III and IV).Over time, a low-grade tumor may become a high-grade tumor. However, the change to a high-grade tumor happens more often among adults than children.[16]

The World Health Organization (WHO) has developed a grading system to indicate a tumor's malignancy or benignity based on its histological features under a microscope. [17]

Table 2.1: World Health Organization (WHO)

Brain Tumor Grades

Grade	Characteristics	Tumor Types	Name of tumor
Low Grade	**WHO Grade I**	• Least malignant (benign) • Possibly curable via surgery alone • Non-infiltrative • Long-term survival • Slow growing	Pilocytic astrocytoma Craniopharyngioma Gangliocytoma Ganglioglioma
	WHO Grade II	• Relatively slow growing • Somewhat infiltrative • May recur as higher grade	"Diffuse" Astrocytoma Pineocytoma Pure oligodendroglioma
High Grade	**WHO Grade III**	• Malignant • Infiltrative • Tend to recur as higher grade	Anaplastic astrocytoma Anaplastic ependymoma Anaplastic oligodendroglioma
	WHO Grade IV	• Most malignant • Rapid growth, aggressive • Widely infiltrative • Rapid recurrence • Necrosisprone	Gliobastomamultiforme (GBM) Pineoblastoma Medulloblastoma Ependymoblastoma

4. Tumor staging

Tumor is based on the anatomic extent of the tumor. The size of the primary tumor and extent of local and distant spread. Several methods of the staging is popular TNM (tumor, node, metastasis) classification, AJC (American Joint Committee) system and WHO classification.

5. Types of primary brain tumors:

There are many types of primary brain tumors. Primary brain tumors are named according to the type of cells or the part of the brain in which they begin. For example, most primary brain tumors begin in glial cells. This type of tumor is called a glioma.

Among adults, the most common types are:

Astrocytoma: The tumor arises from star-shaped glial cells called astrocytes. It can be any grade. In adults, an astrocytoma most often arises in the cerebrum.

- **Grade I or II astrocytoma**: It may be called a low-grade glioma.
- **Grade III astrocytoma**: It's sometimes called a high-grade or an anaplastic astrocytoma.
- **Grade IV astrocytoma**: It may be called a glioblastoma or malignant astrocyticglioma.

Meningioma: The tumor arises in the meninges. It can be grade I, II, or III. It's usually benign (grade I) and grows slowly.

Oligodendroglioma: The tumor arises from cells that make the fatty substance that covers and protects nerves. It usually occurs in the cerebrum. It's most common in middle-aged adults. It can be grade II or III.

Among children, the most common types are:

Medulloblastoma: The tumor usually arises in the cerebellum. It's sometimes called a primitive neuroectodermal tumor. It is grade IV.

Grade I or II astrocytoma: In children, this lowgrade tumor occurs anywhere in the brain. The most common astrocytoma among children is juvenile pilocytic astrocytoma. It's grade I.

Ependymoma: The tumor arises from cells that line the ventricles or the central canal of the spinal cord. It's most commonly found in children and young adults. It can be grade I, II, or III.

Brain stem glioma: The tumor occurs in the lowest part of the brain. It can be a low-grade or high-grade tumor. The most common type is diffuse intrinsic pontineglioma.[18]

6. Epidemiology

Tumors of the central nervous system account for as much as 20% of all cancers of the childhood. In childhood, 70% of primary tumors arise in the posterior fossa. There is nearly equal incidence of primary and metastatic tumors.[2]

7. Brain Tumor Causes

Chromosome:

i. **Functional defect:** Brain tumors are thought to arise when certain genes on the chromosomes of a cell are damaged and no longer function properly. These genes normally regulate the rate at which the cell divides (if it divides at all) and repair genes that fix defects of other genes, as well as genes that should cause the cell to self-destruct if the damage is beyond repair. In some cases, an individual may be born with partial defects in one or more of these genes. Environmental factors may then lead to further damage.

ii. In other cases, the environmental injury to the genes may be the only cause. It is not known why some people in an "environment" develop brain tumors, while others do not.

Cell damage:

Once a cell is dividing rapidly and internal mechanisms to check its growth are damaged, the cell can eventually grow into a tumor.

Immune system blockade:

Another line of defense may be the body's immune system, which optimally would detect the abnormal cell and kill it. Tumors may produce substances that block the immune system from

recognizing the abnormal tumor cells and eventually overpower all internal and external deterrents to its growth.

Angiogenesis factors:

A rapidly growing tumor may need more oxygen and nutrients than can be provided by the local blood supply intended for normal tissue. Tumors can produce substances called angiogenesis factors that promote the growth of blood vessels. The new vessels that grow increase the supply of nutrients to the tumor, and, eventually, the tumor becomes dependent on these new vessels.[19]

8. Risk factors for brain tumors:

A risk factor is something that may increase the chance of getting a disease. The exact causes of brain tumors are not known. Researchers are studying whether people with certain risk factors are more likely than others to develop a brain tumor. Studies have found the following risk factors for brain tumors:

Age: Brain tumors are more common in children and older adults, although people of any age can develop a brain tumor.

Gender: In general, men are more likely than women to develop a brain tumor. However, some specific types of brain tumors, such as meningioma, are more common in women.

Home and work exposures: Exposure to solvents, pesticides, oil products, rubber, or vinyl chloride may increase the risk of developing a brain tumor. However, there is not yet scientific evidence that supports this possible link.

Family history: It is rare for brain tumors to run in a family. Only a very small number of families have several members with brain tumors.About 5% of brain tumors may be linked to hereditary genetic factors or conditions, including Li-Fraumeni syndrome, neurofibromatosis, nevoid basal cell carcinoma syndrome, tuberous sclerosis, Turcot syndrome, and von Hippel-Lindau disease. Scientists have also found “clusters” of brain tumors within some families without a link to these known hereditary conditions. Studies are underway to try to find a cause for these clusters.

Race andethnicity: In the United States, white people are more likely to develop gliomas but less likely to develop meningioma than black people. Also, people from northern Europe are more than twice as likely to develop a brain tumor as people in Japan.

Ionizing radiation: Ionizing radiation from high dose x-rays (such as radiation therapy from a large machine aimed at the head) and other sources can cause cell damage that leads to a tumor. People exposed to ionizing radiation may have an increased risk of a brain tumor, such as meningioma or glioma.

Radiofrequency electromagnetic fields /Cell phone

Cell phones emit radiofrequency energy (radio waves), a form of non-ionizing radiation. Tissues nearest to where the phone is held can absorb this energy. Globally, the number of cell phone subscriptions is estimated by the International Telecommunications Union to be 5 billion.Over time, the number of cell phone calls per day, the length of each call, and the amount of time people use cell phones have increased. Cell phone technology has also undergone substantial changes.[20, 21]

The possible connection between cellphones and cancer is controversial. Many years' worth of studies on cellphones and cancer have yielded conflicting results. The primary concern with cellphones and cancer seems to be the development of brain tumors associated with cellphone use. Some research suggests a slight increase in the rate of brain tumors since the 1970s, but cellphones weren't in use during the 1970s. Instead, the subtle increases are more likely related to other factors such as increased access to medical care and improvements in diagnostic imaging. In one study that followed more than 420,000 cellphone users over a 20-year period, researchers found no evidence of a link between cellphones and brain tumors.[22]Another study found an association between cellphones and cancer of the salivary glands. However, only a small number of study participants had malignant tumors.Another study suggested a possible increased risk of glioma, for the heaviest cellphone users, but no increase in brain tumor risk overall.The prospective Million Women Study in the United Kingdom found that self-reported cell phone use was not associated with an increased risk of glioma, meningioma, or non-central nervous system tumors. The researchers did find that the use of cell phones for more than 5 years was associated with an increased risk of acoustic neuroma, and that the risk of acoustic neuroma increased with increasing duration of cell phone use.[23]International Agency for Research on Cancer agreed that there's limited evidence

that cellphone radiation is a cancer-causing agent (carcinogenic)after evaluating several studies on the possibility of a connection between cellphones and glioma and a noncancerous brain tumor known as acoustic neuroma, members of the. As a result, the group classified radiofrequency electromagnetic fields as possibly carcinogenic to people.

Head Injury: Serious head trauma has long been studied for its relationship to brain tumors. Some studies have shown a link between head trauma and meningioma, but not one between head trauma and glioma.

N-nitroso compounds: Some studies of diet and vitamin supplementation seem to indicate that dietary N-nitroso compounds may raise the risk of both childhood and adult brain tumors. Dietary N-nitroso compounds are formed in the body from nitrites or nitrates found in some cured meats, cigarette smoke, and cosmetics.

Exposure to nerve agents: One study has shown that some Gulf War veterans have an increased risk of a brain tumor from exposure to nerve agents; however, more research is needed before a definitive link can be made.[24]

9. Symptoms of a brain tumor:

The symptoms of a brain tumor depend on tumor size, type, and location. Symptoms may be caused when a tumor presses on a nerve or harms a part of the brain. Also, they may be caused when a tumor blocks the fluid that flows through and around the brain, or when the brain swells because of the buildup of fluid.

These are the most common symptoms of brain tumors:

- Headaches (usually worse in the morning)
- Nausea and vomiting
- Changes in speech, vision, or hearing
- Problems balancing or walking
- Changes in mood, personality, or ability to concentrate
- Problems with memory
- Muscle jerking or twitching (seizures or convulsions)
- Numbness or tingling in the arms or legs
- paresis. [6,8]

10. Diagnosis of brain tumors:

- **Neurologic exam**: It includes examination of vision, hearing, alertness, muscle strength, coordination, and reflexes. Examination of eyes to look for papilloedema (swelling caused by a tumor pressing on the nerve that connects the eye and the brain).
- **CT scan&MRI**: CT scan & MRI detailed pictures inside the head in different sections or plane. Sometimes a special dye (contrast material) is injected into a blood vessel to help show differences in the tissues of the brain. The pictures can show tumor with its size, location, extension.
- **Angiogram**: Sometimes angiogram is required to see the feeding vessels into the tumor or thetumor pressing the large vessels.
- **Spinal tap**: A sample of cerebrospinal fluid sometimes taken with local anesthesia for laboratory check for cancer cells or to understand other symptoms.
- **Biopsy**: The removal of tissue to look for tumor cells is called a biopsy. A biopsy can show cancer cells, tissue changes that may lead to cancer, and other conditions. A biopsy is the only sure way to diagnose a brain tumor including the grade of tumor which help to plan future treatment. Surgeons can obtain tissue to look for tumor cells in four ways:
    - Biopsy at the same time of surgery
    - Stereotactic biopsy (collection of tumor tissue through burr hole)
    - CT/ MRI guided tissue collection
    - Endoscopic tissue collection.[7]

11. Treatment for a brain tumor

Brain tumors have several treatment options. The options are surgery, radiation therapy, and chemotherapy. Many people get a combination of treatments.

The choice of treatment depends mainly on the following:

- The type and grade of brain tumor
- Its location in the brain
- Its size
- Age

- General health

12. Surgical removal of tumor

Surgery is the usual first treatment for most brain tumors. Surgery to open the skull is called a craniotomy. The whole or partial removal of the tumor done by surgery. After the tumor is removed, the brain is covered by the skull bones or with the piece of bone or with a piece of metal or fabric.Sometimes surgery isn't possible. If the tumor is in the brain stem or certain other areas, the surgeon may not be able to remove the tumor without harming normal brain tissue. People who can't have surgery may receive radiation therapy or other treatment. Now a days endoscopic surgery is also done to reduce pressure inside brain or removal of tumor. Sometimes recurrence of tumor may occur or tumor can develop other part of the brain following surgery. In those cases several surgery may require.[25]

13. Complications following surgery:

- The brain may swell or fluid may build up within the skull increase pressure
- Uncomfortable for the first few days after surgery
- Headache
- Uncontrolledpain
- Generalized weakness
- Infection of wound site
- Brain surgery may harm normal tissue. Brain damage can be a serious problem. It can cause problems with thinking, seeing, or speaking. It can also cause personality changes or seizures. Most of these problems lessen or disappear with time. But sometimes damage to the brain is permanent.[25]

14. Radiation therapy for brain tumors:

Radiation therapy kills brain tumor cells with high-energy x-rays, gamma rays, or protons.Radiation therapy usually follows surgery. The radiation kills tumor cells that may remain in the area. Sometimes, people who can't have surgery have radiation therapy instead.

External radiation therapy: Direct beams of radiation at either the whole brain or more commonly, at specific portions of the brain. Some people need radiation aimed at the spinal cord also. The treatment schedule depends on age, and the type and size of the tumor. Giving the total dose of radiation over several weeks helps to protect healthy tissue in the area of the

tumor. Treatments are usually 5 days a week for several weeks. A typical visit lasts less than an hour, and each treatment takes only a few minutes.

Intensity-modulated radiation therapy or 3-dimensional conformal radiation therapy: These types of treatment use computers to more closely target the brain tumor to lessen the damage to healthy tissue.

Proton beam radiation therapy: The source of radiation is protons rather than X-rays. The doctor aims the proton beam at the tumor. The dose of radiation to normal tissue from a proton beam is less than the dose from an X-ray beam.

Stereotactic radiation therapy: Narrow beams of X-rays or gamma rays are directed at the tumor from different angles. The therapy may be given during a single visit (stereotactic radiosurgery) or over several visits.

Internal radiation therapy (implant radiation therapy or brachytherapy): The radiation comes from radioactive material usually contained in very small implants called seeds inside brain. They don't need to be removed once the radiation is gone.[7]

Side effects after treatment

- Generalized weakness
- Headache
- Nausea
- Hair loss which usually grows back within a few months
- skin on the scalp and ears get red, dry, and tender
- Sometimes brain tissue to swell raise pressure and headache
- Seizures
- Death
- Radiation may harm the pituitary gland and other areas of the brain. For children, this damage could cause learning problems or slow down growth and development.
- In addition, radiation increases the risk of secondary tumors later in life.[7]

15. Chemotherapy for brain tumors:

Chemotherapy, the use of drugs to kill cancer cells, is sometimes used to treat brain tumors. Drugs may be given in the following ways:

- **By mouth or vein (intravenous)**: Chemotherapy may be given during and after radiation therapy. Common side effects include nausea and vomiting, loss of appetite, headache, fever and chills, and weakness. The drugs lower the levels of healthy blood cells, likely to get infections, bruise or bleed easily, and feel very weak and tired.
- **In wafers that are put into the brain**: For some adults with high-grade glioma, the surgeon implants several wafers into the brain. Each wafer is about the size of a dime. Over several weeks, the wafers dissolve, releasing the drug into the brain. The drug kills cancer cells. It may help prevent the tumor from returning in the brain after surgery to remove the tumor. People who receive an implant (a wafer) that contains a drug are monitored by the health care team for signs of infection after surgery.[26]

16. Supportive care for Brain tumor patients:

Supportive care may be needed before, during, and after cancer treatment. It can improve comfort and quality of life during treatment.

- **Swelling of the brain**: Many people with brain tumors need steroids to help relieve swelling of the brain.
- **Seizures: Brain tumors can cause seizures (convulsions)**. Certain drugs can help prevent or control seizures.
- **Fluid buildup in the skull**: If fluid builds up in the skull, the surgeon may place a shunt to drain the fluid.
- **Sadness and other feelings**: It's normal to feel sad, anxious, or confused after a diagnosis of a serious illness.

Many people with brain tumors receive supportive care along with treatments intended to slow the progress of the disease. Some decide not to have antitumor treatment and receive only supportive care to manage their symptoms.[27]

17. Rehabilitation after brain tumor treatment:

Rehabilitation can be a very important part of the treatment plan. The goals of rehabilitation depend on needs and how the tumor has affected ability of individual to carry out daily activities.Some people may never regain all the abilities they had before the brain tumor and its treatment. Several types of therapists can help:

- **Physical therapists**: Brain tumors and their treatment may cause paralysis. They may also cause weakness and problems with balance. Physical therapists help people regain strength and balance.
- **Speech therapists**: Speech therapists help people who have trouble speaking, expressing thoughts, or swallowing.
- **Occupational therapists**: Occupational therapists help people learn to manage activities of daily living, such as eating, using the toilet, bathing, and dressing.
- **Physical medicine specialists**: Medical doctors with special training help people with brain tumors stay as active as possible. They can help people recover lost abilities and return to daily activities.
- **For children** with brain tumors may have special needs. Sometimes children have tutors in the hospital or at home. Children who have problems learning or remembering what they learn may need tutors or special classes when they return to school.[28]

18. Follow-up after brain tumor treatment:

Regular checkups after treatment for a brain tumor is required usually after three months interval. Checkups may include careful physical and neurologic exams, as well as MRI or CT scans. In case of shunt it is necessary to see its functioning properly.[25]

Chapter: III

Materials and methods

Materials and methods:

3.1 Place of the study:

Department of Neurosurgery, National Institute of Neurosciences.

3.2: Duration of the study:

November 2015 to January 2016

3.3Study population: All the Patients attended Department of Neurosurgery, National Institute of Neurosciences during study period.

3.4Sample size: Sample size was calculated purposively according to the inclusion and exclusion criteria. The sample size was 220.

220 cases of brain tumor patients selected from Department of Neurosurgery, National Institute of Neurosciencesirrespective of age and sex.

3.5Sampling method(s): Purposive sampling was done on availability of patients during the study period with strictly considering the inclusion and exclusion criteria. All the patients, fulfilling the inclusion and exclusion criteria, were enrolled for the study. Those patient's or patient's attendants refusing to attend the study were excluded.

3.6 Sample selection:

1. Patients presenting with neurological disorders irrespective of type of illness.

2. Patients attending Department of Neurosurgery, National Institute of Neurosciencesirrespective of age and sex.

3. Patients who give consent to attend the study.

3.7 Variables: Main outcome variables were studied.

Table 3.1: Variables of the study

Sociodemographic Factors :	• Age • Sex • religion • residence • Occupation • Educational status • Monthly family income
Presenting complaints:	• Headache • Vomiting • Convulsion • Diminished visual activity • Reduce movement • Inability to walk • Inability to play • Ability to perform regular activities • Sleep disturbance
Treatment related factors:	• History of medication • Visit of doctors
Family history:	• Family history of tumors
Diagnosis related factors:	• CT scan • MRI • PET CT
Surgery related factors	• No. of operation • Name of operation • Complications following operation
Tumor related factors:	• Type of tumor • Location of tumor

	• Histological type • Severity of tumor

3.8 Procedures of preparing and organizing materials:

A questionnaire and a written informed consent form was prepared, sample was selected on the basis of inclusion & exclusion criteria, questionnaire was filled with informed written consent.Data were collected with semi structured questionnaire face to face interview with the patient or attendant. Professional assistance from experts or attending doctors was consulted for collection of data. Expert opinions were also taken from specialists and statistician for analysis.

3.9Procedure of data analysis of interpretation:

Data were entered in SPSS 17 software after cross checking. Data were further analyzed by using statistical software SPSS 17. Both descriptive and inferential statistics wereused to analyze the data. Results were described as percentages. Some of the baseline characteristics of the cases were expressed as means and +/- SD and others as percentages with range. Data were also be present with several Tables.Data were analyzed cautiously with SPSS 17.0 software.

3.10 Quality assurance strategy:

Cautions were taken during data collection, data processing, data analysis. All the incomplete data were rejected and properly edited with cross checking.

3.11Ethical implication:

Protocol was ethically reviewed and approved by The Ethical Review of national Institute of neurosciences. Informed written Consent was taken from the participants before enrolling them into the study. Anonymity was maintained and none of the names were used in the data bases. The procedures were explained to them and they were informed that if they did not wish to be included in the study there was no way hamper the treatment of their patient and at any point of the study, if they wish, they could be withdrawn themselves from the study at any time. Permission had also been taken from concerned department where study was undertaken.

3.12Dissemination and use of the findings:

Findings of this research must be helpful for the researchers for better understanding of the disease pattern. Future research can also done for policy making in this field.

Chapter:IV

Analysis

Analysis:

The present analysis was conducted in the Indoor of the Department of Neurosurgery, National Institute of Neurosciences, Dhaka on 220 patients withbrain tumor during the period of November 2015 to January 2016 The data obtained was tabulated and expressed as frequency and percentages.

1. Age distribution of the respondents: There were participants of different ages who were selected in the study. The following Table used to represent the group wise distribution of the age in years of the respondents.

Table 4.1: Distribution of the study subjects by age (n = 220)

Age	Frequency	Percentage
<10	20	9.1
10–19	22	10.1
20–29	27	12.2
30–39	43	19.5
40–49	75	34.1
50–59	18	8.2
>60	15	6.8
total	220	100.0

From the table 4.1 it was observed that highest numbers of respondents were from 40-49 years of age covering 34.1 % of the respondents. The lowest and highest ages of the patients were 3 months and 65 years respectively.

Data can be presented as bar diagram as follows:

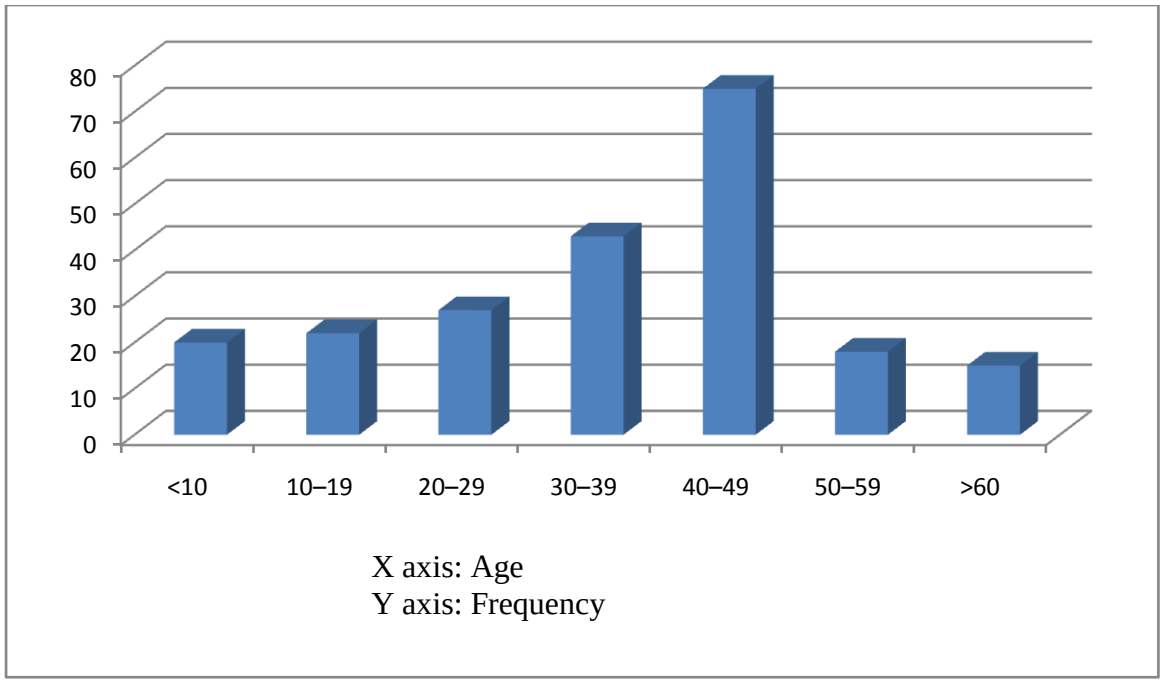

Fig 4.1: Bar diagram of age distribution of the respondents

2. Sex distribution of the respondents:

There were participants of two sex who were selected in the study. The following Table used to represent the group wise distribution of the sex in years of the respondents.

Table 4.2: Distribution of the study subjects by sex (n = 220)

Sex group	Frequency	Percentage (%)
Male	124	56.6
Female	96	43.4
Total	220	100

From the table 4.2 it was observed that sex distribution of the study patients. Among the 220 patients in the study it was observed that majority, 124(56.6%) patients were male and 96(43.4%) patients were female.

Data can be presented as Pie diagram as follows:

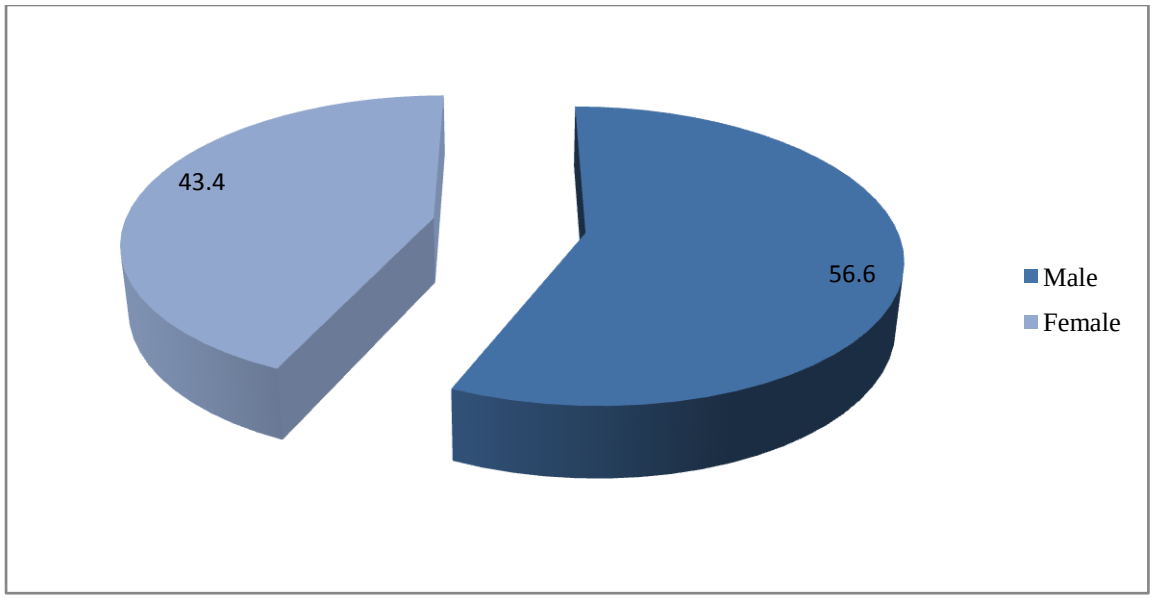

Fig 4.2. Sex distribution (percentage) of the participants

3. History of religion of the participants: The following Table used to represent the history of religion of the participants.

Table 4.3: History of religion of the participants (n = 220)

Religion	Frequency	Percentage (%)
Islam	180	81.8
Hindu	33	15.0
Buddha	3	1.4
Christian	4	1.8
Others	0	0
Total	220	100

From the table 4.3 it was observed that distribution of religion of the study patients. Among the 220 patients in the study it was observed that majority from Islam 180 (81.8%).

Data can be presented as Pie diagram as follows:

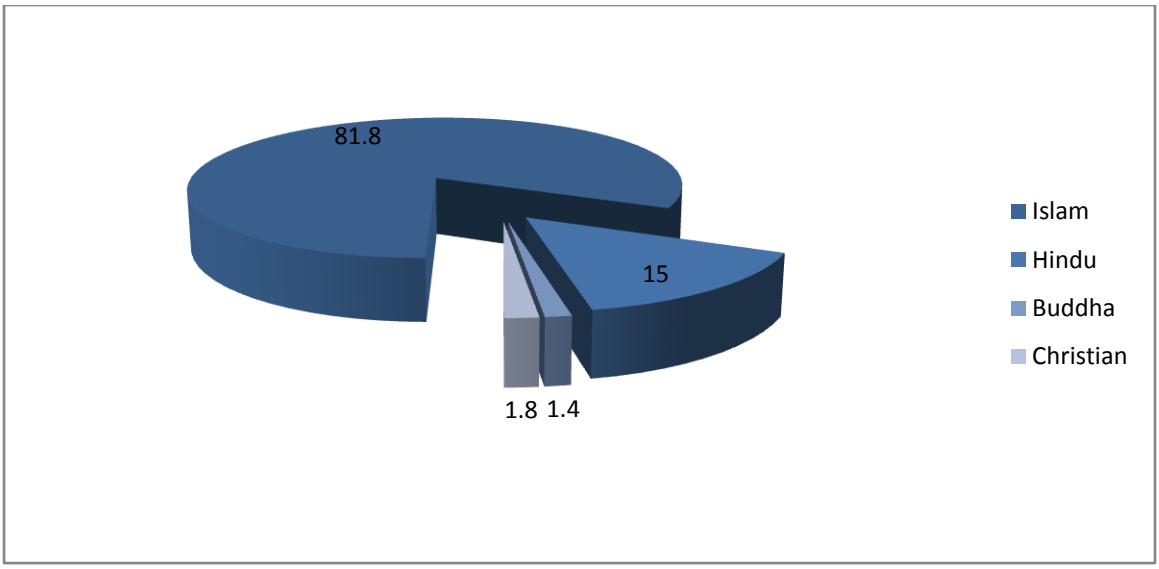

Fig.4.3 Distribution of religion (percentage) of the study patients

4.Distribution of the residence of respondents: The following Table used to represent the Distribution of the residence of respondents.

Table 4.4: Distribution of the residence of respondents (n=220)

Area of residence	Frequency	Percentage (%)
Urban	57	25.9
Semi urban	53	24.1
Rural	90	40.9
Slum	20	9.1
Total	220	100

From the table 4.4 it was observed that highest numbers of respondents were from rural area covering 40.9 % of the respondents. The urban population covering 25.9% and slum covering 9.1%.

Data can be presented as bar diagram as follows:

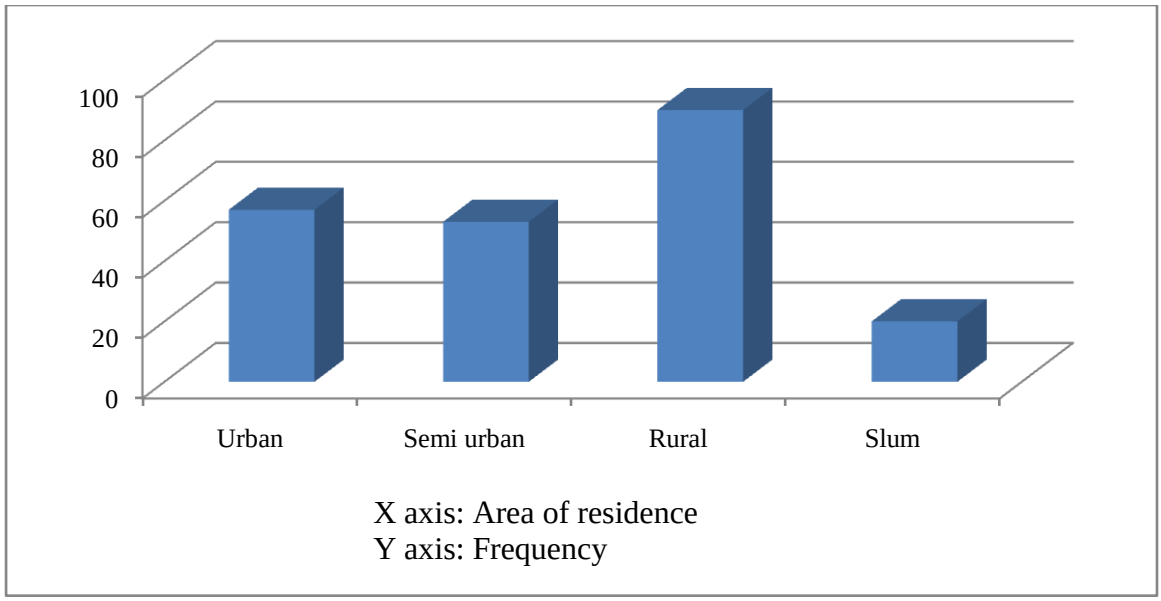

Fig 4.4 Residence of the respondents of the study

5.Distribution of the education among participants: The following Table used to represent the Distribution of the education among participants.

Table 4.5: Distribution of the education among participants (n=220)

Level of education	Frequency (n)	Percentage (%)
No education	54	24.5
Primary education	50	22.8
SSC	66	30.0
Undergraduate	10	4.5
Graduate	20	9.1
Post graduate	20	9.1
Total	220	100.0

From the table 4.5 it was observed that distribution of the education among participants. The highest number of participants (66 cases) had passed SSC, primary education were completed by 50 cases, 54 had no education.

Data can be presented as Pie diagram as follows:

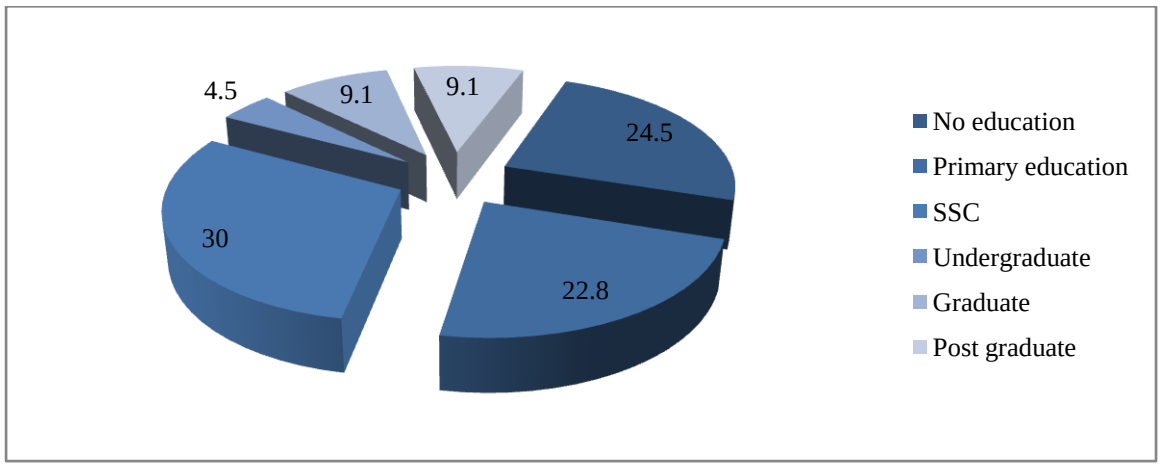

Fig 4.5 Distribution of level of education (percentage) among the study subjects

6.Distribution of occupation of the respondents: The following Table used to represent the Distribution of the education among participants.

Table 4.6: Distribution of occupation of the respondents (n=220)

Occupation	Frequency	Percentage (%)
Student	38	17.3
Housewife	70	31.8
Agriculture	25	11.3
Service	40	18.3
Business	30	13.6
Retired	10	4.5
others	7	3.2
Total	220	100.0

From the table 4.6 it was observed that distribution of occupation of the respondents. Therewere 70 (31.8%) housewives, 40 (18.3%) service holder, 38 (17.3%) students, 30 (13.6%) businessman, 25 (11.3%)agricultural workers among the participants.

Data can be presented as bar diagram as follows:

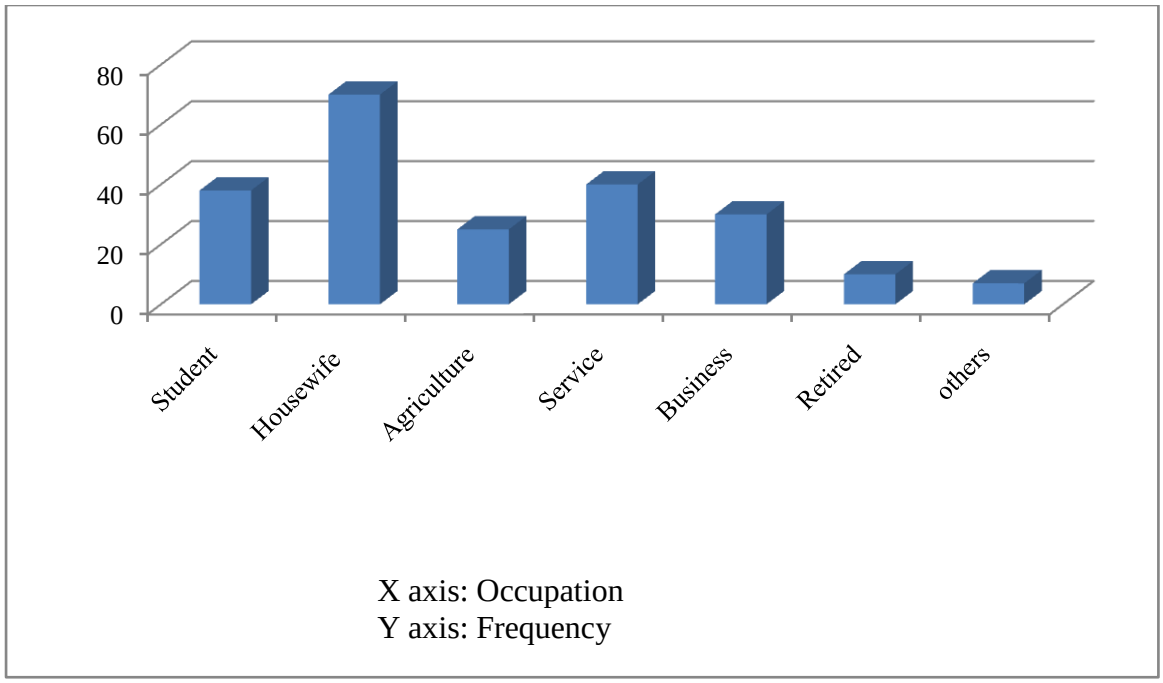

Fig 4.6 Distribution of occupation of the respondents

7. Distribution of family income of the patients: The following Table used to represent the Distribution of family income of the patients.

Table 4.7: Distribution of family income of the patients (n=220)

Family income (Tk.)	Frequency	Percentage (%)
Below 5,000	10	4.6
5,000- Below 10,000	35	15.9
10,000-Below 15,000	70	31.8
15,000-Below 200, 000	90	40.9
Above 20,000	15	6.8
Total	220	100.0

From the table 4.7 it was observed that distribution of family income of the patients.The highest income range was 15,000to 20,000 Taka.

Data presented as pie diagram

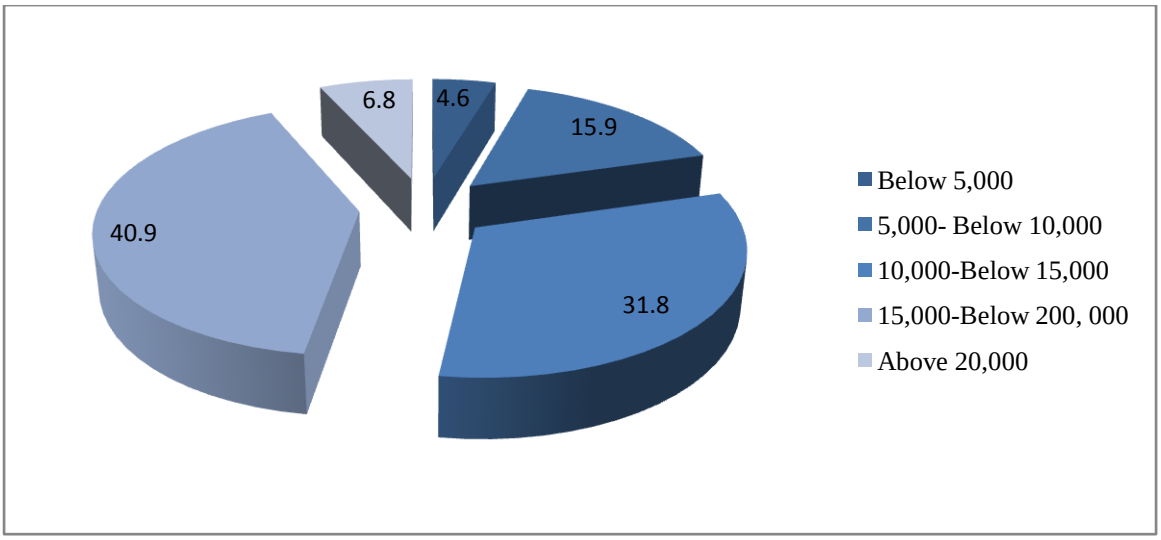

Fig 4.7 Distribution of family income of the patients

8.Distribution of chief complaints of the patient: History of the presenting complaints of the participants was illustrated below in Table 4.8.

Table 4.8:Distribution of chief complaints of the patient

Complaints	Frequency	Percentage (%)
Headache	220	100
Vomiting	130	59.1
Convulsion	80	36.3
Diminished visual activity	55	25.0
Reduce movement	95	43.1
Inability to walk	20	9.09
Inability to play	20	9.09
Ability to perform regular activities	150	68.1
Sleep disturbance	90	40.9

From the table 4.8 it was observed that among220 patients all had headache, 130 patients had vomiting, 80 had convulsion, 95 had reduce movement, 150 failed to perform regular activities, 90 had sleep disturbance.

Data can be presented as bar diagram as follows:

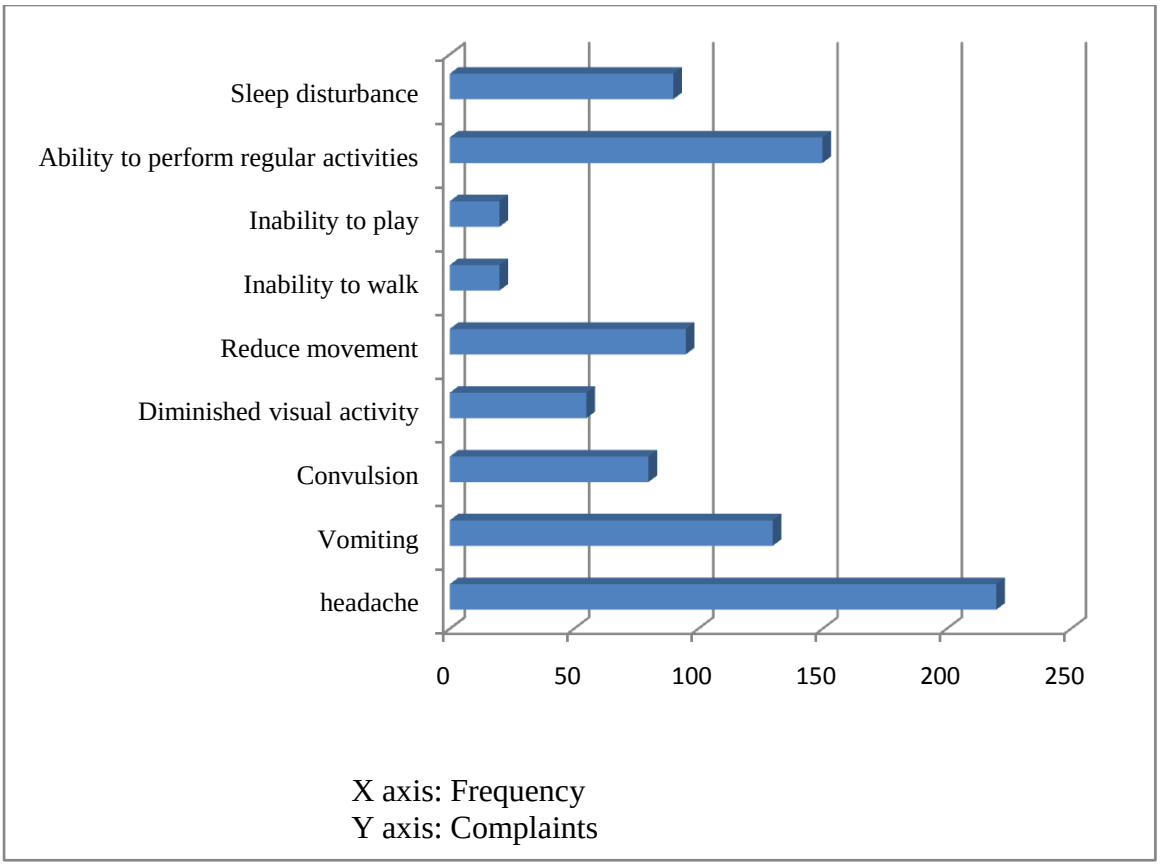

Fig 4.8:Bar diagram of chief complaints of the patient

9.Distribution of history of medication: History of medication of the participants was illustrated below in Table 4.9.

Table 4.9:Distributionof history of medicationof the patient (n=220)

History of medication	Frequency	Percentage (%)
Regular	180	81.8
irregular	20	9.2
Not at all	15	9.8
During attacks	5	0.2
Total	220	100.0

From the table 4.9 it was observed that regular medication was taken by 180 (81.8%) patients, 15 (9.8%) never took any medication.

Data can presented as following line diagram

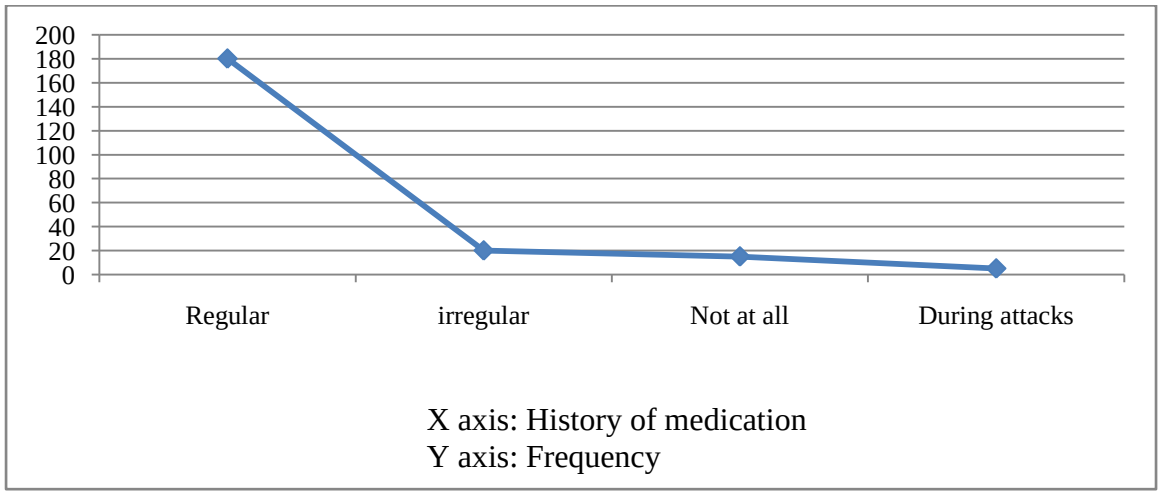

Fig 4.9 Line diagram of history of medication of respondents

10.Distribution of visit of Doctors: History of visit of the doctors of the participants was illustrated below in Table 4.10.

Table 4.10: Distribution of visit of Doctors (n=220)

Visit of doctors	Frequency	Percentage (%)
Visit as per recommendation	70	31.8
Sometimes	35	15.9
Not at all	15	6.8
Only when attacks	100	45.5
Total	220	100.0

From the table 4.10 it was observed that 100 (45.5%) patients had frequent visit to doctors during attack, 70 (31.8%) cases had regular visit as per recommendation.

Data can be presented as bar diagram as follows:

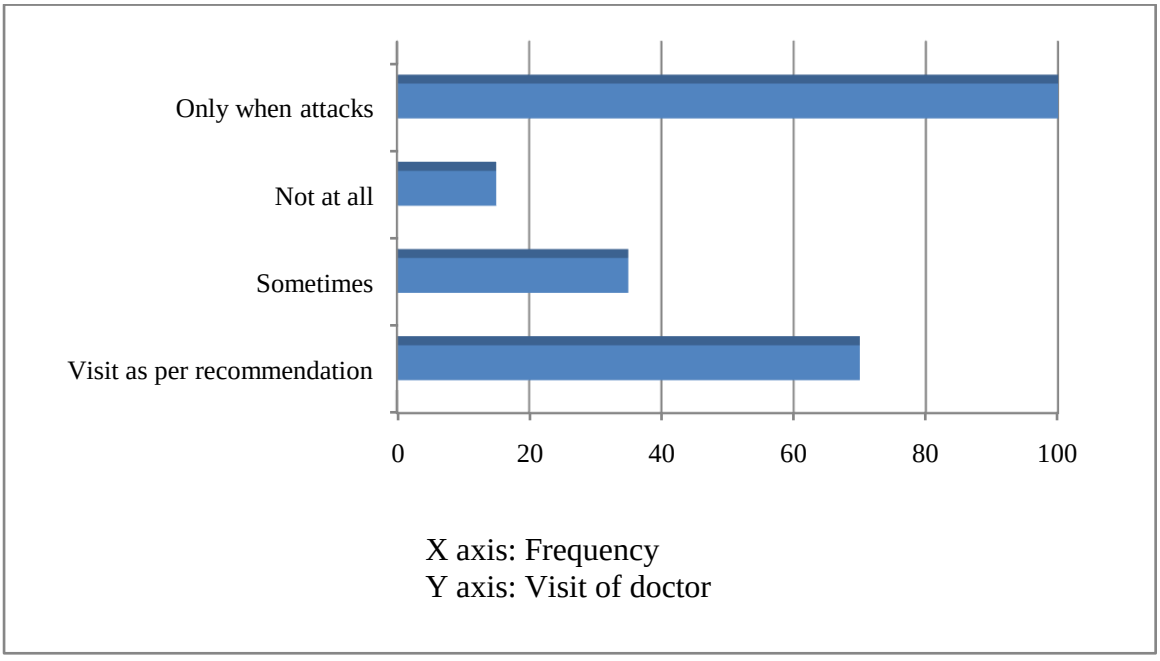

Fig 4.10 Distribution of visit of doctors of the patients

11. Distribution of family history of brain tumor among the respondents: The following Table used to represent the Distribution of family history of brain tumor among the respondents.

Table 4.11: Distribution of family history of brain tumor among the respondents (n=220)

Family history	Frequency	Percentage (%)
yes	10	4.5
no	210	95.5
Total	220	100.0

From the table 4.11 it was observed that only 10 (4.5%) patients had positive family history.

Data can be presented as Pie diagram as follows:

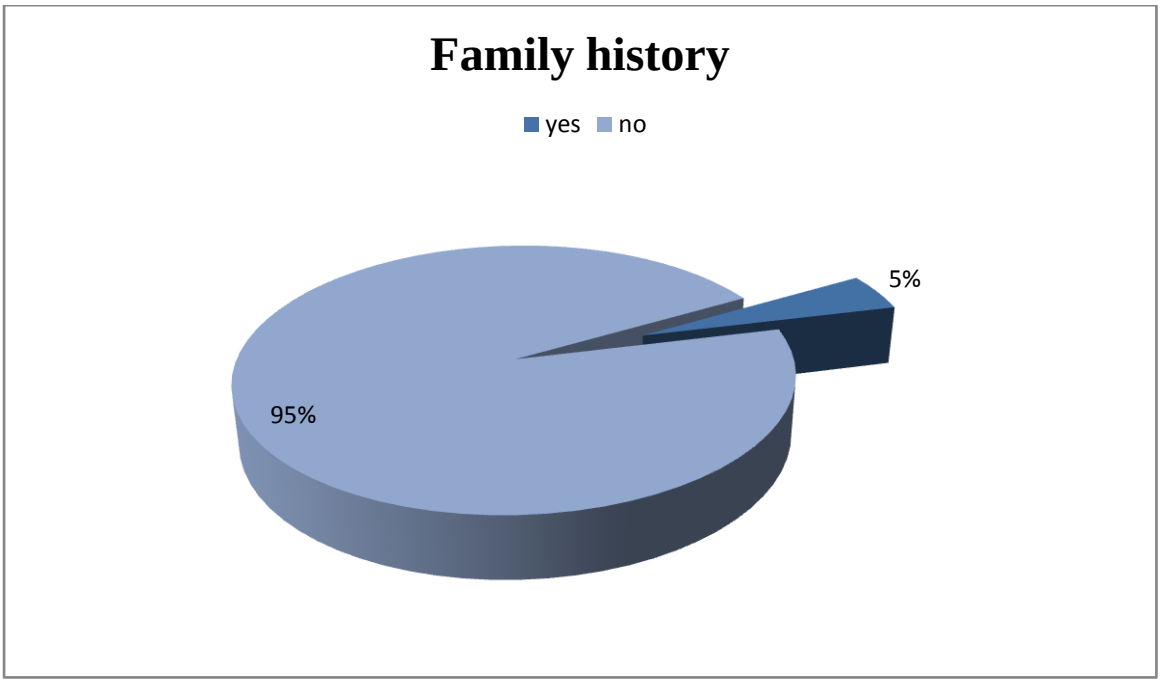

Fig 4.11 Distribution of family history of brain tumor among the respondents

12. Distribution of process of diagnosis of brain tumor among the participants: The following Table used to represent the Distribution of family history of brain tumor among the respondents.

Table 4.12:Distribution of process of diagnosis of brain tumor among the participants (n=220)

Process of diagnosis	Frequency	Percentage (%)
CT scan	48	21.8
MRI	167	75.9
Pet CT	5	2.3
Total	220	100.0

From the table 4.12distribution of process of diagnosis of brain tumor among the participantswere stated. Majority of the cases (167, 75.9%) were primarily diagnosed with MRI.

Data can presented as following line diagram

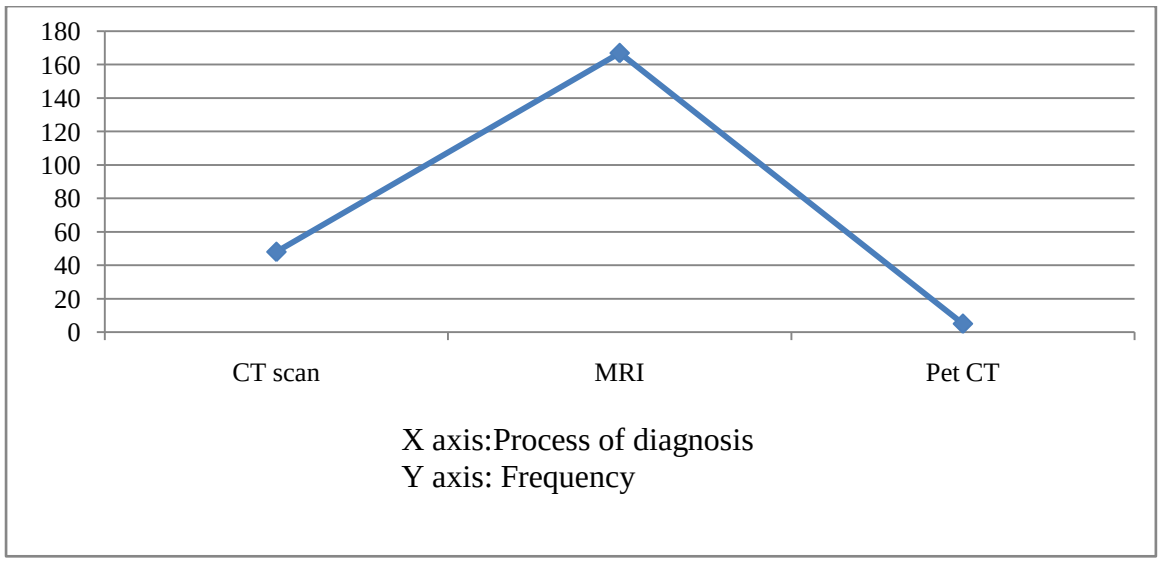

Fig 4.12 Line diagram of process of diagnosis of brain tumor among the participants

13. Distribution of no. of operation of the participants: The following Table used to represent the Distribution of no. of operation of the participants.

Table 4.13: Distribution of no. of operation of the participants (n=220)

No. of operation	Frequency	Percentage (%)
Once	150	68.2
Twice	60	27.3
More than twice	10	4.5
Total	220	100.0

From the table 4.13 it was observed that majority of the cases (150; 68.2%) had one surgery. More than twice surgery was required among 10 (4.5%) cases.

Data can be presented as Pie diagram as follows:

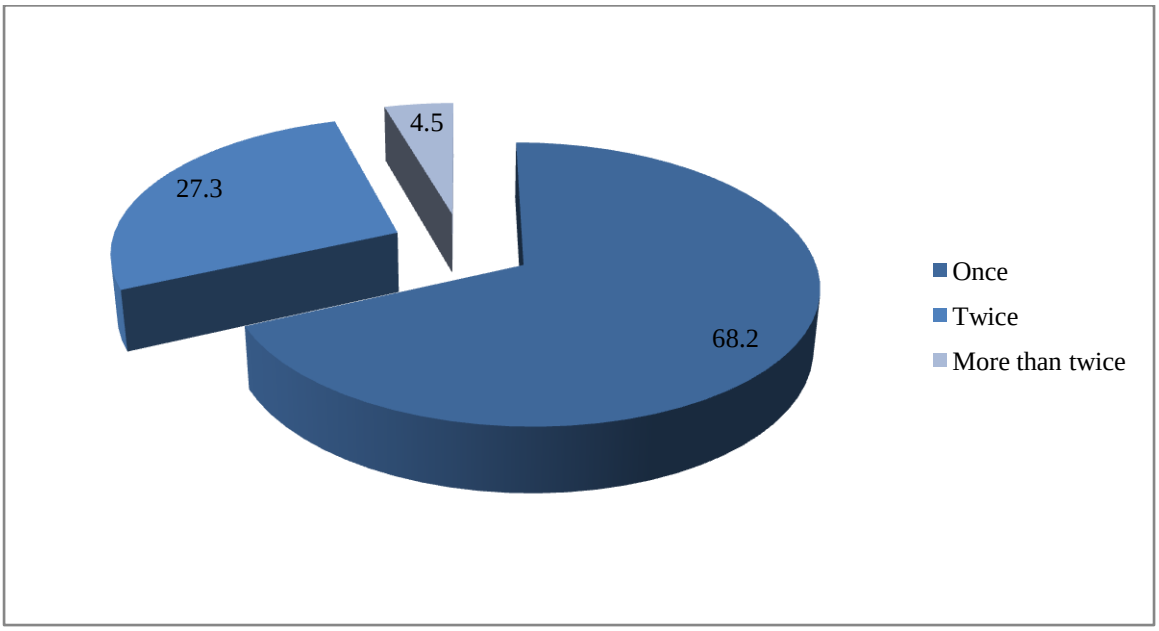

Fig 4.13 Pie diagram of no. of operation of the participants

14. Distribution of name of operation of the participants: The following Table used to represent the Distribution of name of operation of the participants.

Table 4.14: Distribution of name of operation of the participants (n=220)

Name of operation	Frequency	Percentage (%)
Craniotomy	115	52.3
Craniectomy	57	25.9
Endoscopic removal	48	21.8
Total	220	100.0

From the table 4.14 it was observed that craniotomy was done among 115 (52.3%) cases, Craniectomy was observed among 57 (25.9%) cases, Endoscopic removal of tumor was done in 48 (21.8%) cases.

Data can be presented as bar diagram as follows:

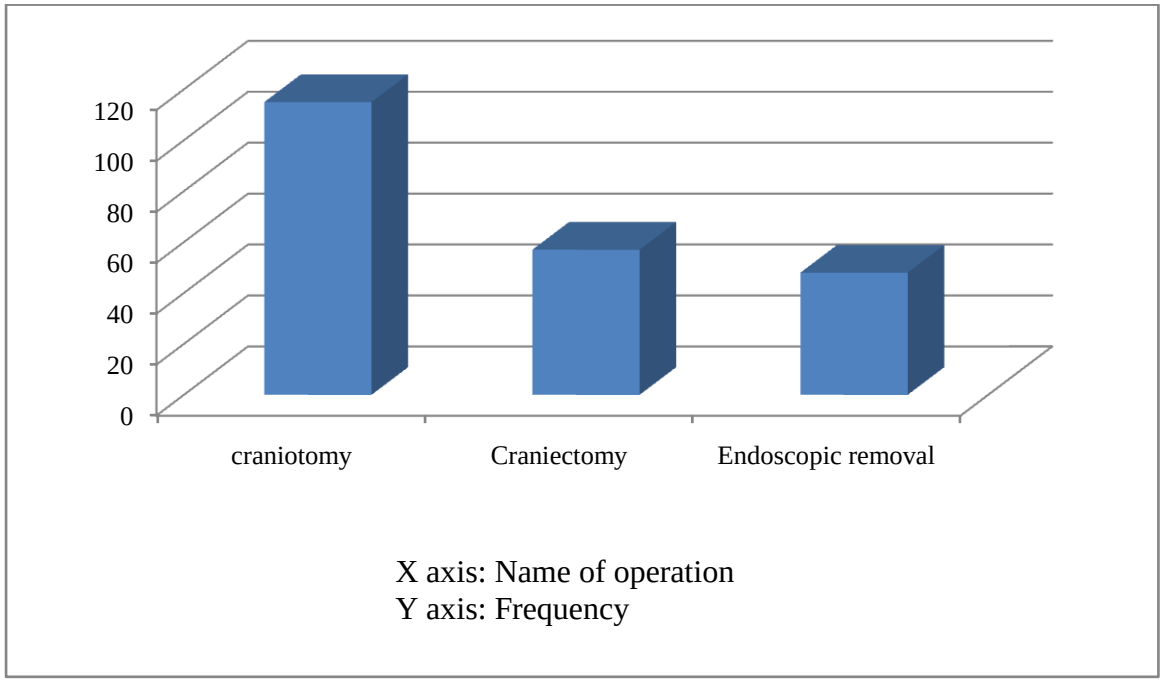

Fig 4.14: Bar diagram of name of operation of the participants

15. Distribution of complications among the patients: The following Table used to represent the Distribution of complications among the patients.

Table 4.15: Distribution of complications among the patients (n=220)

Complications	Frequency	Percentage (%)
Minor complications	135	61.3
Major complications	25	11.4
No complication	60	27.3
Total	220	100.0

From the table 4.15 it was observed that minor complications observed in 135 (61.3%) cases, major complications were in 25 (11.4%) cases.

Data can presented as following line diagram:

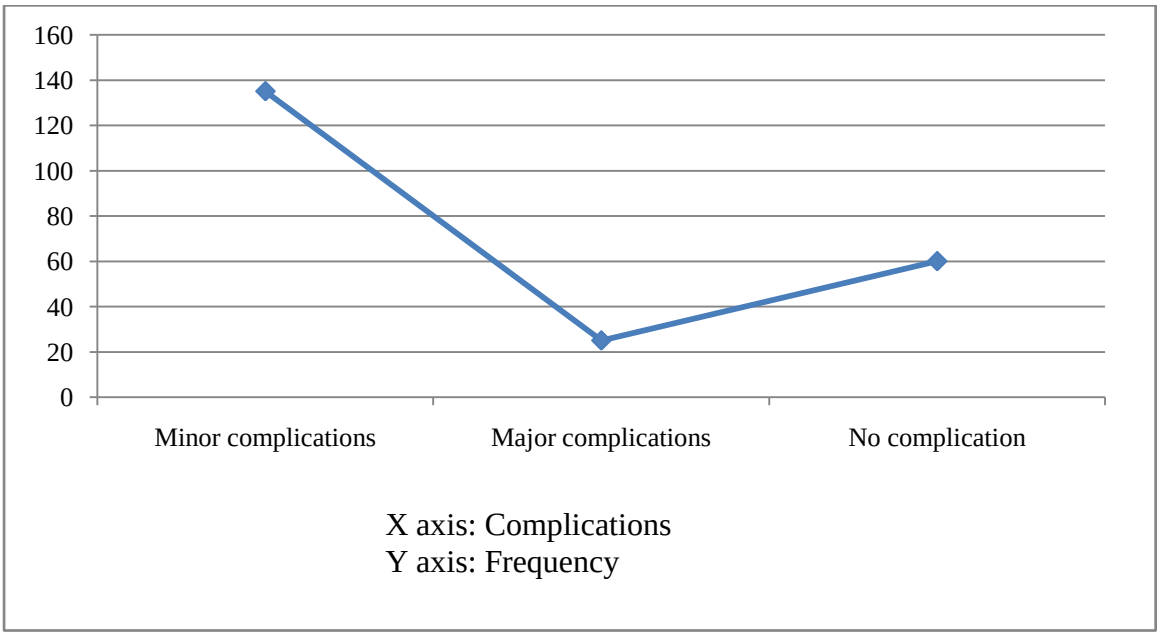

Fig 4.15: Distribution of complications among the patients

16. Distribution of types of tumor: Types of tumor of the participants was illustrated below in Table 4.16.

Table 4.16: Distribution of types of tumor (n=220)

Age of onset	Frequency	Percentage
Childhood tumor	42	19.1
Adult tumor	178	80.9
Total	220	100.0

From the table 4.16 it was observed that childhood tumor was found among 42 (19.1%) cases and adult tumor cases were found 178 (80.9%) cases.

Data can be presented as Pie diagram as follows:

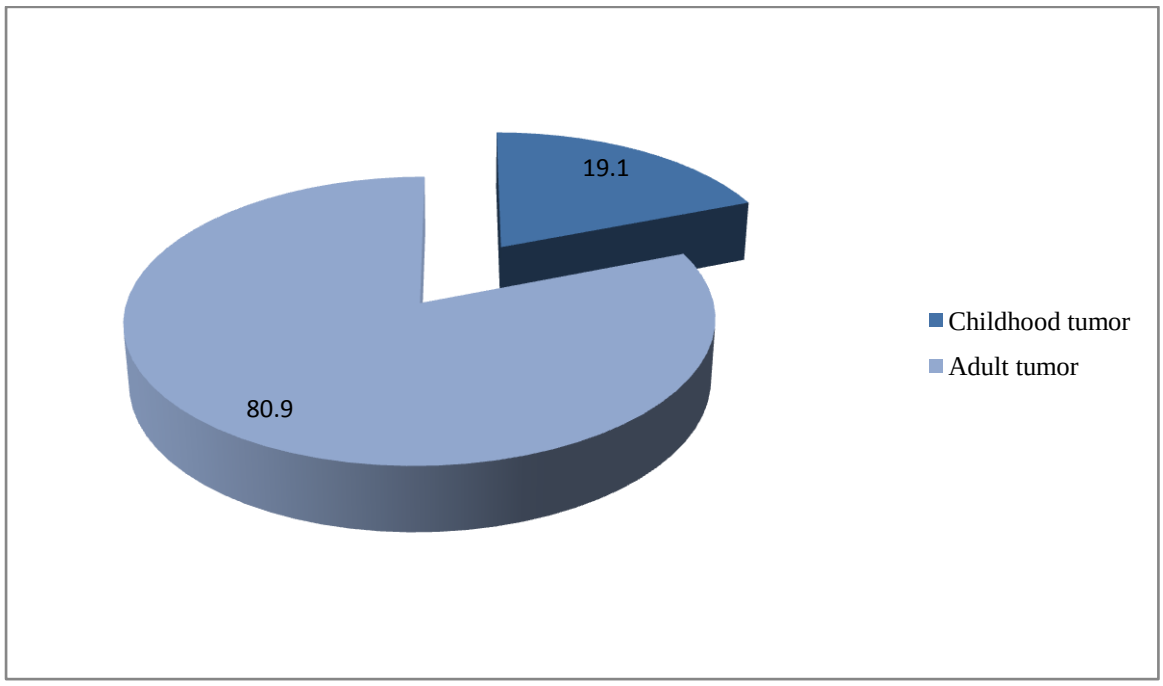

Fig 4.16: Pie diagram of types of tumor

17. Distribution of the study subjects by tumor location: Distribution of the study subjects by tumor location was illustrated below in Table 4.17.

Table 4.17: Distribution of the study subjects by tumor location (n=220)

Location of tumor	Frequency	Percentage (%)
Frontal lobe	35	15.9
Parietal	40	18.2
Temporal	5	2.3
Occipital	15	6.8
Thalamus	1	0.5
Cerebellum	2	0.9
Pituitary	122	55.4
Total	220	100

From table 4.17distribution of the study subjects by tumor location in which pituitary cases were highest (122; 55.4% cases), frontal lobe tumors were 35 (15.9%) cases and parietal lobe tumors were in 40 (18.2%) cases.

Data can be presented as bar diagram as follows:

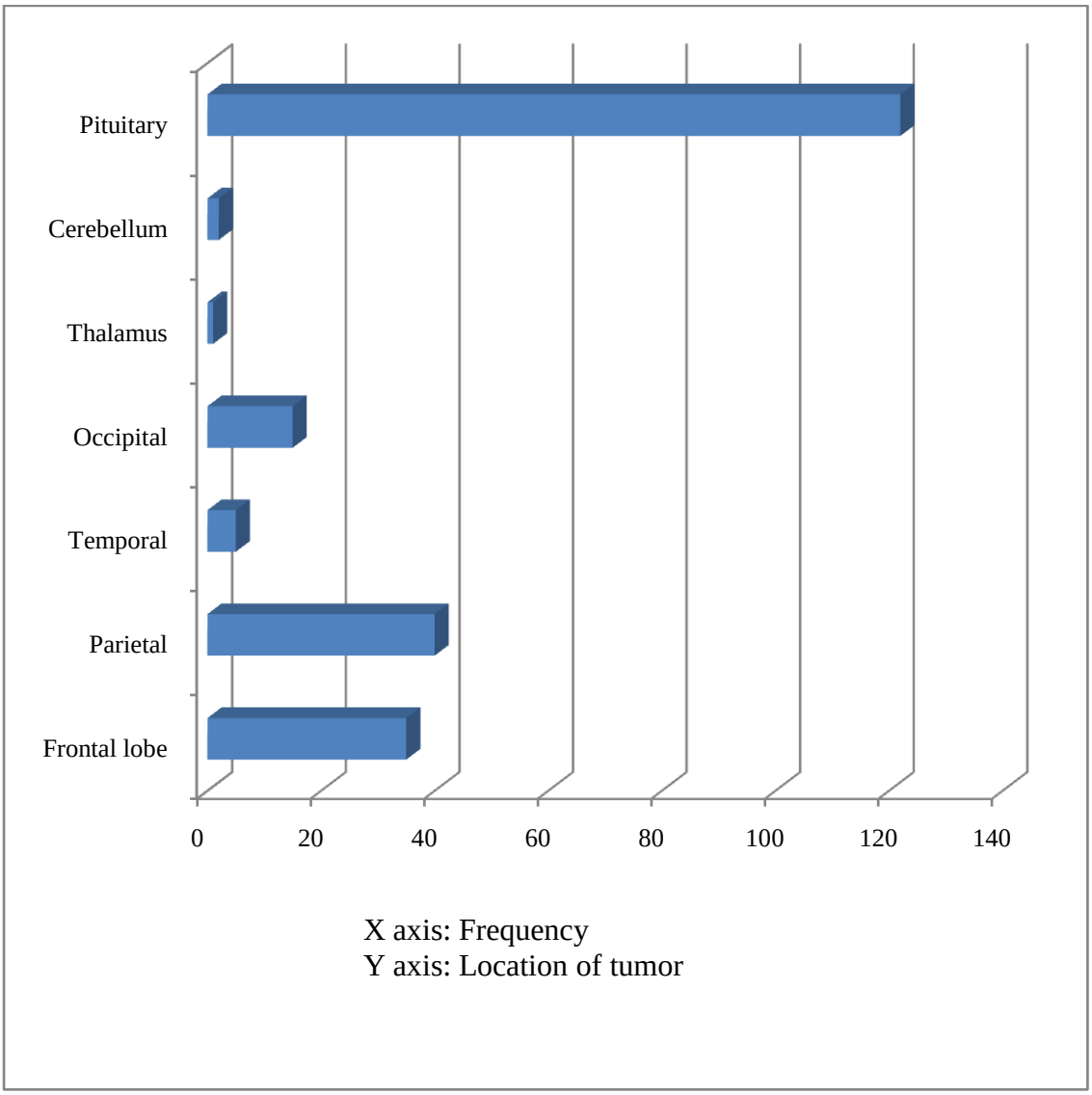

Fig 4.17: Bar diagram of the study subjects by tumor location

18. Distribution of histological diagnosis of brain tumor among respondents:

Distribution of histological diagnosis of brain tumor among respondents was illustrated below in Table 4.18.

Table 4.18: Distribution of histological diagnosis of brain tumor among respondents (n=220)

Histopathological diagnosis	Frequency	Percentage (%)
Astrocytoma	17	7.7
Pituitary adenoma	122	55.4
Meningioma	28	12.7
Ependymoma	5	2.3
Hemangioblastoma	2	0.9
Glioma	25	11.3
Medulloblastoma	9	4.3
Neurofibroma	5	2.3
Choroid plexus papilloma	1	0.4
Metastatic tumor	6	2.7
Total	220	100.0

From the table 4.18 it was observed that distribution of histological diagnosis of brain tumor among respondentsin which pituitary cases were highest (122; 55.4% cases), Glioma was 25 (11.5%) cases, Meningioma was 28 (12.7%) cases, Astrocytoma was 17 (7.7%) cases.

Data can be presented as Pie diagram as follows:

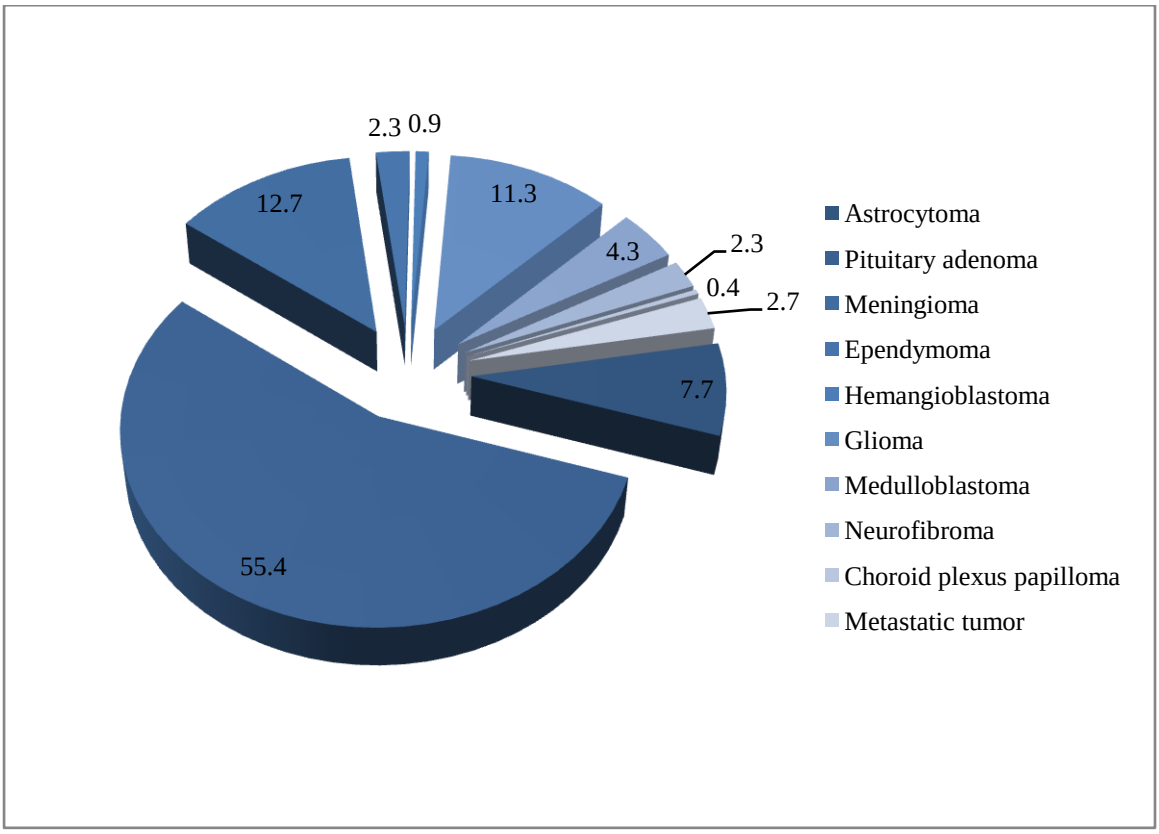

Fig 4.18: Distribution of histological diagnosis of brain tumor among respondents

19. Distribution of severity of tumor: The following Table used to represent the distribution of complications among the patients.

Table 4.19: Distribution of severity of tumor (n=220)

Severity of tumor	Frequency	Percentage (%)
WHO grade I	130	59.1
WHO grade II	70	31.8
WHO grade III	15	6.8
WHO grade IV	5	2.3
Total	220	100

From the table 4.19 it was observed that distribution of severity of tumor in which WHO grade I was highest (130; 59.1% cases), WHO grade II was 70 (31.8%) cases, WHO grade III was 15 (6.8%) cases and WHO grade IV was in 5 (2.3%) cases.

Data can presented as following line diagram:

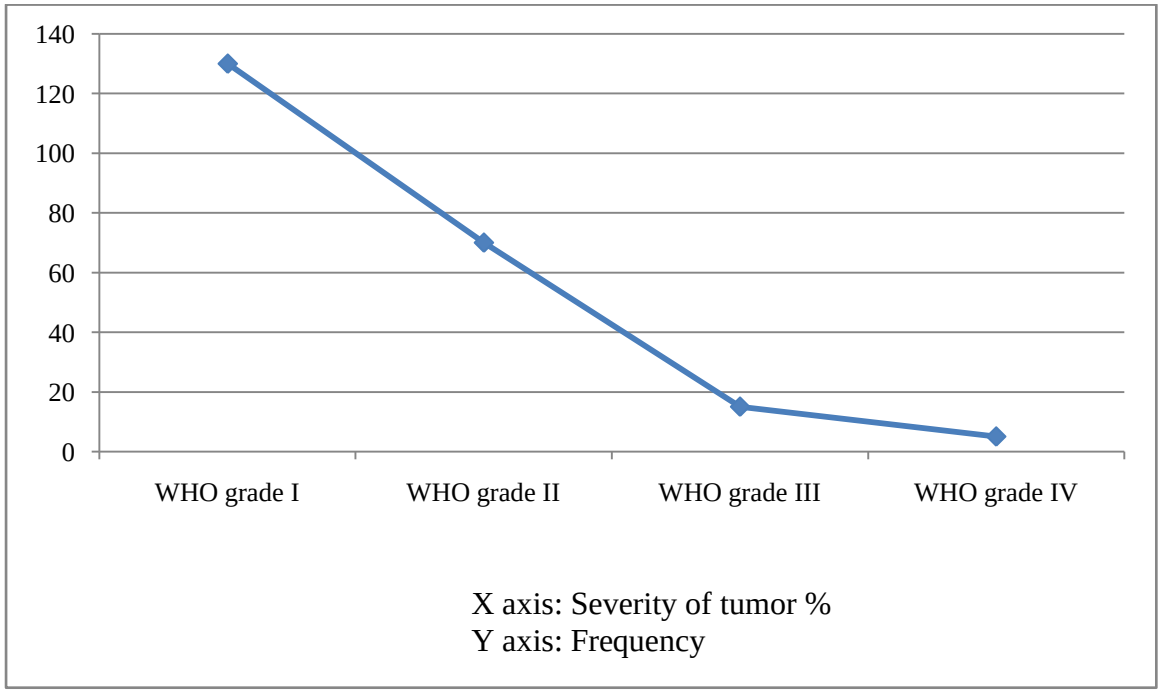

Fig 4.19: Line Diagram of severity of tumor

20. Distribution ofVisit to Doctor by Residence: For brain tumor patient, visit of doctor varies from different area of residence. Here 4 types of residence area are focused:

1. Urban 2. Semi urban 3.Rural 4.Slum.The following Table used to represent the correlation between residence and visit of doctoramong the tumor patients.

Table 4.20: Distribution table of Visit to Doctor by Residence

Residence of Patients	**Visit of doctor**				Total
	As per recommended	Sometimes	Not at all	Only When Attacks	
Urban	15	9	3	30	57
Semi Urban	19	9	0	25	53
Rural	31	17	2	40	90
Slum	5	0	10	5	20
Total	70	35	15	100	220

From the table 4.20 it was observed that in urban 26.3% patients visits to doctor as per recommended and 52.6% patients visit to doctor only when attacks. In semi urban area 35.8% patients visits to doctor as per recommended and 47.2% patients visit to doctor only when attacks. In rural area 34.4% patients visit to doctor as per recommended and 44.4% patients visit to doctor only when attacks.

21. Distribution ofvisit to doctor and income: Income is an important factor for treatment of tumor patients. It is necessary to know whether visit of doctorvaries with Income. In this study the income level of a family per month was grouped as followed-

1. Below 5000
2. 5000- below 10000
3. 10000-below 15000
4. 15000-below 20000
5. Above 20000

The distribution of income and visit of doctor is shown in table 4.21:

Table 4.21: Distribution of Income and Visit of doctor

Income	Visit of doctor				Total
	As per recommended	sometimes	Not at all	Only When Attacks	
Below 5000	0	0	9	1	10
5000- below 10000	14	4	3	14	35
10000-below 15000	24	11	2	33	70
15000-below 20000	24	18	0	48	90
Above 20000	8	2	1	4	15
Total	70	35	15	100	220

From the table 4.21 it was observed that distribution of income and visit of doctorin which highest numbers of respondents were from the income between 15000- below 20000 (40.9%) and lower patients were from the income below 5000. Income between 10000- below 15000 patients visits to doctor 31.8%.

22. Distribution of Age and Severity of tumor: Distribution of age and severity of tumor are given below in table 4.22:

Table 4.22: Distribution of Age and Severity of tumor:

Age (years)	Severity of Tumor				Total
	WHO grade I	WHO grade II	WHO grade III	WHO grade IV	
< 10	15	5	0	0	20
10-19	14	7	1	0	22
20-29	14	8	2	3	27
30-39	25	13	4	1	43
40-49	41	28	6	0	75
50--59	9	7	1	1	18
>60	12	2	1	0	15
Total	130	70	15	5	220

From the table 4.22 it was observed that distribution of age and severity of tumorin whichage <30 years had 62.3% grade I, 29.0% in grade II, 4.3% in grade III and 4.3% in grade IV severity of tumor.Age between 30-49 years had 55.9% grade I, 34.7% in grade II, 8.5% in grade III and 0.8% in grade IV severity of tumor. Age >49 years had 63.6% grade I, 27.3% in grade II, 6.1% in grade III and 3.0% in grade IV severity of tumor.

23. Distribution ofGender and History of medication: Distribution of gender and history of medication are given below in table 4.23:

Table 4.23: Distribution of Gender and History of medication:

Gender	History of Medication				Total
	Regular	Irregular	Not at all	During Attacks	
Male	102	13	7	2	124
Female	78	7	8	3	96
Total	180	20	15	5	220

From the table 4.23 it was observed that among male patients, history of medication found 82.3% regular, 10.5% irregular, 5.6% had no medication history, 1.6% found during attacks.Whereas among female patients, history of medication found 81.3% regular, 7.3% irregular, 8.3% had no medication history, 3.1% found during attacks.

24. Distribution of gender and Family history: Distribution of gender and family history are given below in table 4.24:

Table 4.24: Distribution of Gender and Family history:

Gender	Family History		Total
	Yes	No	
Male	9	115	124
Female	1	95	96
Total	10	210	220

From the table 4.24 it was observed that among male patients 7.3% had family history and 92.7% had no family history.Whereasamong female patients, 1.0% had family history and 99.0% had no family history.

25. Distribution of gender and complication: Distribution of gender and complication are given below in table 4.25:

Table 4.25: Distribution of Gender and Complication:

Gender	Complication			Total
	Minor	Major	No Complication	
Male	80	9	35	124
Female	55	16	25	96
Total	135	25	60	220

From the table 4.25 it was observed that among male patients, 64.5% had minor, 7.3% had major and 28.2% had no complication. Whereasamong female patients, 57.3% had minor, 16.7% had major and 26.0% had no complication.

26. Distribution of gender and severity of tumor: Distribution of gender and severity of tumor are given below in table 4.26:

Table 4.26: Distribution ofGender and Severity of tumor

Gender	Severity of Tumor				Total
	WHO grade I	WHO grade II	WHO grade III	WHO grade IV	
Male	74	42	6	2	124
Female	56	28	9	3	96
Total	130	70	15	5	220

From the table 4.26 it was observed that among male patients, 59.7% had WHO grade I, 33.9% had WHO grade II, 4.8% had WHO grade III and 1.6% had WHO grade IV severity of tumor. Whereasamong female patients, 58.3% had WHO grade I, 29.2% had WHO grade II, 9.4% had WHO grade III and 3.1% had WHO grade IV severity of tumor.

Chapter: V

Conclusion

&

Recommendation

CONCLUSION

Brain tumor cases are increasing in numbers in our country. The fatality of the tumor cases put extra burden to the economy. Brain tumors refer to a mixed group of neoplasm originating from the intracranial tissues and the meninges with degrees of malignancy ranging from benign to aggressive. The mortality and morbidity of brain tumor extends in different age and sex. Benign tumors can be lethal due to their site in the brain, their ability to infiltrate locally and the propensity to transform to malignancy.[29] Current study try to focus on primary, metastatic and other lesions of brain which include the site of cerebrum, cerebellum and other parts of the brain. The incidence of brain tumor rises with the age range from less than 10 years to more than 60 years.[30]This study also show similar pattern. It is more common between the ages of 40–49 years with a drop in incidence over 60 years. This study also shows more frequency (75 study subjects) between the age of 40–49 years. Males are more likely to be diagnosed than females, with a male:female ratio of 1.3:1.Similar results are documented in one study.[31] In another study, brain tumors to be more commonly diagnosed in males than females and that most are detected in older adults.[32]According to cancer registry of South Australia the incidence increases with age. It is relatively low under 30 years of age and higher among males than in females.[33]

These data differ from the Mayo Clinic and the Central Brain Tumor Registry of the United States where they reported that there is a small peak before the age of 10 years and a steady rise from 15 years onwards, with the highest incidence between the age of 75 and 84 years. This discrepancy may be due to higher life expectancy in the western world.[34] Among the 220 patients in the study it was observed that majority from Islam 180 (81.1%) as the Islam is major religion of the country 90%.In other socio economic characteristics 40.9% brain tumor patients were from rural areas. In Bangladesh majority of the people live in rural area.[35] Patients in the study are from different level of education. Majority of the patients were housewife as many of them live in rural area. Majority of the study subjects family income were 15,000-20,000 Tk. The average family income is 10,000 Tk.[35]

Among 220 patients childhood tumor was found among 40 (18.2%) cases and adult tumor cases were found 180 (81.8%) cases. They all had headache, 130 patients had vomiting, 80 had convulsion, 95 had reduce movement, 150 failed to perform regular activities, 90 had sleep disturbance. Similar result found in earlier study.[36]

Regular medication was taken by 180 (81.8%) patients, 100 (45.5%) patients had frequent visit to doctors during attack, 70 (31.8%) cases had regular visit as per recommendation. Visit of the doctor vary according to the severity of the illness.[37]

Only 10 (4.5%) patients had positive family history.Majority of the cases (167, 75.9%) were primarily diagnosed with MRI.Majority of the cases (150; 68.2%) had one surgery. More than twice surgeries were required among 10 (4.5%) cases.Craniotomy was done among 115 (52.3%) cases, Craniectomy was observed among 57 (25.9%) cases, Endoscopic removal of tumor was done in 48 (21.8%) cases.Minor complications observed in 135 (61.3%) cases, major complications were in 25 (11.4%) cases. The findings are about similar. [36]

In this study, pituitary cases were highest (122; 55.4% cases), frontal lobe tumors were 35 (15.9%) cases and parietal lobe tumors were in 40 (18.2%) cases. Brain tumors in adult arising in the frontal, temporal and parietal lobe collectively form the greatest proportion and majority (86%). The number might vary as the center is leading center for pituitary surgery.

In histopathological studies, pituitary cases were highest (122; 55.4% cases), Glioma was 25 (11.5%) cases, Meningioma was 28 (12.7%) cases, Astrocytoma was 17 (7.7%) cases. In one study Gliomas was highest operated cases.[38]
WHO grade I was highest (130; 59.1% cases), WHO grade II was 70 (31.8%) cases, WHO grade III was 15 (6.8%) cases and WHO grade IV was in 5 (2.3%) cases.

In urban, 26.3% patients visits to doctor as per recommended and 52.6% patients visit to doctor only when attacks. In semi urban area 35.8% patients visits to doctor as per recommended and 47.2% patients visit to doctor only when attacks. In rural area 34.4% patients visit to doctor as per recommended and 44.4% patients visit to doctor only when attacks.

Age <30 years had 62.3% grade I, 29.0% in grade II, 4.3% in grade III and 4.3% in grade IV severity of tumor. Age between 30-49 years had 55.9% grade I, 34.7% in grade II, 8.5% in grade III and 0.8% in grade IV severity of tumor. Age >49 years had 63.6% grade I, 27.3% in grade II, 6.1% in grade III and 3.0% in grade IV severity of tumor.

Among male patients, history of medication found 82.3% regular, 10.5% irregular, 5.6% had no medication history, 1.6% found during attacks. Among female patients, history of medication found 81.3% regular, 7.3% irregular, 8.3% had no medication history, 3.1% found during attacks.

Among male patients, 64.5% had minor, 7.3% had major and 28.2% had no complication. Among female patients, 57.3% had minor, 16.7% had major and 26.0% had no complication.

Among male patients, 59.7% had WHO grade I, 33.9% had WHO grade II, 4.8% had WHO grade III and 1.6% had WHO grade IV severity of tumor. Among female patients, 58.3% had WHO grade I, 29.2% had WHO grade II, 9.4% had WHO grade III and 3.1% had WHO grade IV severity of tumor

The observation of the study suggests that the brain tumor in patients vary with age and sex. The different varieties of brain lesions in our population exists with male predominence with peak age of 40-49 years. Glioma, Meningioma, Astrocytoma and Pitutary tumors are most common types. WHO grade I is most common in relation to severity of the tumor. Types of tumor and grading vary different prognostic importance and success rate of tumor treatment.

Recommendation:

1. Further study is necessary to better define different types of tumor.
2. Newer study on different modality of diagnosis for early detection of tumor.
3. Advanced studies to understand the improvement and well being of the individual in cancer treatment.
4. Further need of low cost treatment facility to reduce the economic burden.
5. Genetic and molecular studies to understand the disease process to reduce mortality and morbidity.
6. Further study is necessary to better define different types of tumor.
7. Newer study on different modality of diagnosis for early detection of tumor.
8. Advanced studies to understand the improvement and well being of the individual in cancer treatment.
9. Further need of low cost treatment facility to reduce the economic burden.
10. Genetic and molecular studies to understand the disease process to reduce mortality and morbidity.
11. Health education and awareness among people.
12. Government policy to reduce the brain tumor cases.

Chapter: VI

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