Original Article

CT Scan Evaluation of Patients Presenting with Headache and Weakness

Shagufta Mahmood[1]*

ABSTRACT

Introduction: *Headache and neurological weakness are common symptoms that often indicate underlying serious conditions, necessitating accurate and timely diagnosis. This study aims to evaluate the CT scan findings in patients presenting with headache and weakness at M.A Rashid Hospital, Jamalpur, Bangladesh.* **Methods & Materials:** *This observational study was conducted from June 15th, 2024, to July 15th, 2024, involving 30 patients who underwent CT scans of the head. Data were collected using a structured proforma and analyzed using the Statistical Package for the Social Sciences (SPSS). Patients were grouped based on gender, and the analysis included both continuous and categorical data.* **Results:** *The mean age of the patients was 48 years, with a male predominance (63.3%). Hypertension was present in 20.0% of the patients, and 3.3% had a history of diabetes or trauma. Headache (70.0%) and weakness (53.3%) were the most common symptoms. CT scans revealed normal findings in 20.0% of the cases. Significant findings included acute infarcts, intracerebral hemorrhages, subdural hematomas, and sinusitis. Lacunar infarcts at the thalamus and basal ganglia, combined with cerebral atrophy and chronic microvascular ischaemia, were observed in 3.3% of patients.* **Conclusion:** *The study highlights the critical role of CT imaging in diagnosing a range of intracranial abnormalities in patients with headache and weakness. The findings emphasize the need for comprehensive clinical evaluations and judicious use of CT scans to ensure timely and accurate diagnosis, ultimately improving patient management and outcomes in secondary care hospitals in Bangladesh.*

Keywords: *Headache, Weakness, CT scan, Intracranial Abnormalities, Diagnostic Imaging*

1. Associate Professor (CC), Department of Radiology and Imaging, United Medical College, Dhaka, Bangladesh

INTRODUCTION

Headache and neurological weakness are common symptoms that prompt patients to seek medical attention, often indicating underlying serious conditions. Globally, headache disorders are among the most prevalent neurological conditions, affecting up to 46% of the adult population annually[1]. In Bangladesh, the burden of these symptoms is significant due to limited access to specialized neurological care and diagnostic facilities, exacerbating the challenges in managing these conditions effectively[2]. Accurate and timely diagnosis of headache and weakness is crucial for preventing severe outcomes such as stroke, intracranial hemorrhage, and brain tumors. Delays in diagnosis can lead to significant morbidity and mortality, highlighting the importance of effective diagnostic tools[3]. Imaging techniques, particularly computed tomography (CT) and magnetic resonance imaging (MRI), play a pivotal role in the diagnosis of neurological conditions. While MRI offers detailed images and superior contrast resolution, CT scans are more readily available, faster, and cost-effective, making them indispensable in emergency settings[4,5]. CT scans are particularly effective in

identifying acute conditions such as intracranial hemorrhage, ischemic stroke, and brain tumors, which are critical to diagnose promptly to guide appropriate treatment strategies[6]. Studies have demonstrated the high sensitivity of CT scans in detecting subarachnoid hemorrhage, with one meta-analysis highlighting a significant yield of CT angiography in patients with acute severe headaches and normal initial CT scans[7]. In the context of Bangladesh, the healthcare infrastructure presents unique challenges. Peripherally located secondary care hospitals in Bangladesh have also made impressive progress in providing essential surgical services, but significant gaps remain in infrastructure, human resources, and equipment availability[8]. A cross-sectional study on the utilization of radiology and imaging equipment in Government run district hospitals of Bangladesh revealed that a substantial proportion of the equipment is either nonfunctional or underutilized, primarily due to the lack of maintenance and spare parts[9]. Moreover, the availability of advanced imaging technologies such as CT and MRI is limited, particularly in rural and sub-district hospitals, where infrastructure shortages persist[10]. However, the

secondary care,district level private hospitals are playing important part in rendering health care services. The integration of information and communication technologies in healthcare, such as telemedicine and mHealth services, has shown promise in improving accessibility to medical consultations, but progress has been slow and uneven[11]. Cultural and socioeconomic factors further complicate the presentation, diagnosis, and management of patients with headache and weakness in Bangladesh. The healthcare system in Bangladesh suffers from overcrowding, insufficient funding, and a lack of medical expertise and advanced technology, driving many patients to seek medical treatment abroad in countries like India, Thailand, Malaysia, and Singapore[12]. This medical travel trend underscores the perceived inadequacies in the local healthcare system and the need for significant improvements in healthcare delivery[13]. A study on the availability of essential diagnostics in low-income and middle-income countries, including Bangladesh, highlighted major gaps in diagnostic availability, particularly in primary care facilities, which are critical for early and accurate diagnosis[14]. The utilization patterns of CT scans in clinical practice for patients presenting with headache and weakness underscore their importance. In pediatric patients with recurrent headaches, CT scans are frequently used to rule out serious underlying conditions, despite concerns about radiation exposure[15]. Comparative studies have shown that while MRI offers more detailed imaging, CT scans are preferred in emergency settings due to their rapid availability and lower cost[16]. A study comparing CT and MRI findings in patients presenting with headaches in Central India found that CT scans were effective in initial evaluations, especially in detecting acute conditions that require immediate intervention[17]. Despite the advancements, there are significant regional challenges in optimizing the use of CT scans in Bangladesh. A study on the availability and readiness of healthcare facilities in Bangladesh indicated that while facilities designated for immunization services showed high readiness, there were substantial gaps in diagnostic capacity, particularly in rural areas[18]. This highlights the need for targeted investments in healthcare infrastructure and human resources to improve diagnostic capabilities and overall healthcare delivery. In conclusion, the effective use of CT scans for diagnosing patients with headache and weakness is critical in preventing severe outcomes and improving patient care. However, significant challenges remain in Bangladesh due to limited infrastructure, inadequate maintenance of equipment, and cultural and socioeconomic barriers. Private, secondary care Hospitals like M.A Rashid Hospital in Jamalpur, is making significant contributions in health care services in Bangladesh. Addressing these challenges through targeted investments and policy interventions is essential to enhance the healthcare system's capacity to provide timely and accurate diagnoses, ultimately improving patient outcomes.

METHODS & MATERIALS

This observational study was conducted at the Department of Radiology, M.A Rashid Hospital, Jamalpur, Bangladesh, a secondary care private Hospital. The study duration was from June 15th, 2024, to July 15th, 2024. During this period, 30 patients who presented with headache and weakness underwent CT scans of the head. A proforma was prepared to collect data systematically, and patients were grouped into two categories. Group I consisted of male patients with headaches and weakness, while Group II included female patients with similar symptoms. No cases underwent contrast administration. Collected data was analyzed using the Statistical Package for the Social Sciences (SPSS) program. For continuous data, the mean and standard deviation were calculated, while categorical data were analyzed using proportions and percentages. This approach ensured a comprehensive analysis of the patient data, facilitating a clear understanding of the diagnostic outcomes and associated factors.

RESULTS

The study population consisted of 30 patients with a mean age of 48 years (±19.17), ranging from 1 to 85 years. Among the patients, 63.3% (n=19) were male, and 36.7% (n=10) were female. The clinical history revealed that 3.3% (n=1) of the patients had a history of diabetes mellitus (DM), 20.0% (n=6) had a history of hypertension (HTN), and 3.3% (n=1) had a history of trauma. Regarding symptoms and signs, 70.0% (n=21) of the patients presented with headaches, and 53.3% (n=16) experienced general or localized weakness. Other reported symptoms included slurring of speech (3.3%, n=1), inability to move (3.3%, n=1), trauma (3.3%, n=1), vertigo (13.3%, n=4), convulsions (3.3%, n=1), blurred vision (3.3%, n=1), vomiting (3.3%, n=1), road traffic accidents (RTA) (3.3%, n=1), low-speed walk (LSW) (3.3%, n=1), photophobia (3.3%, n=1), and Bell's palsy (3.3%, n=1).

Table – I: Characteristics of Study Population (n=30)

Characteristics	Frequency (*n*)	Percentage (%)
Age	48±19.17 (minimum 1, maximum 85)	
Sex		
Male	19	63.3
Female	11	36.7
Clinical History		
H/O DM	1	3.3
H/O HTN	6	20.0
H/O trauma	1	3.3
Symptoms and Signs		
Headache	21	70.0
Weakness (Generalized/Localized)	16	53.3
Slurring of speech	1	3.3
Unable to move	1	3.3
Trauma	1	3.3
Vertigo	4	13.3
Convulsion	1	3.3
Blurred vision	1	3.3
Vomiting	1	3.3
RTA	1	3.3
LSW (left sided weakness)	1	3.3
Photophobia	1	3.3
Bell's Palsy	1	3.3

The CT scan was not done for 1 patient and was done for the remaining 29, which revealed a range of abnormalities. A total of 20.0% (n=6) of the scans were reported as normal. Various types of infarcts and hemorrhages were identified in the remaining patients. Specifically, 3.3% (n=1) showed acute infarcts in both cerebral hemispheres and deep white matter with chronic ischemic changes, and another 3.3% (n=1) had an acute infarct in the right cerebellar hemisphere along with a lacunar infarct in the left hemipons. Acute left-sided intracerebellar hemorrhage was found in 3.3% (n=1) of patients, and another 3.3% (n=1) had acute right thalamic and right cerebellar infarcts, along with old lacunar infarcts and cerebral atrophy (CA) combined with chronic microangiopathy (CMI). Additionally, 3.3% (n=1) had an acute subarachnoid hemorrhage, while another patient showed encephalomalacia changes and mild cerebral atrophy as a sequel to perinatal asphyxia. Lacunar infarcts at the right thalamus and both basal ganglia with cerebral atrophy and chronic microvascular ischaemia were seen in 3.3% (n=1) of patients. Large infarcts at the temporo-occipito-parietal lobe combined with sinusitis were observed in 10.0% (n=3) of the cases. A left-sided large subacute subdural hematoma was found in 3.3% (n=1), and mild cerebral atrophy in another 3.3% (n=1). Notably, 3.3% (n=1) of the scans showed no significant intracranial abnormality, and another 3.3% (n=1) had no significant intracranial abnormality but with left-sided oto-mastoiditis. Similarly, 3.3% (n=1) had no significant intracranial abnormality along with mild sinusitis, and another patient had a normal brain but with right maxillary and bilateral ethmoid sinusitis. Other findings included old lacunar infarcts at the left occipital lobe, both basal ganglia, corona radiata, left frontal lobe, cerebral atrophy with chronic microvascular ischaemia in 3.3% (n=1) of patients. Recent infarcts at the left internal capsule with bilateral old lacunar infarcts and sinusitis were observed in 10.0% (n=3) of the cases. A recent right-sided cerebral infarct involving the corpus callosum with cerebral atrophy and chronic microvascular ischaemia was found in 3.3% (n=1). Additionally, a small hemorrhage at the left temporal lobe was identified in 3.3% (n=1), and small infarcts in both basal ganglia and corona radiata combined with mild cerebral atrophy were observed in 3.3% (n=1) of the patients.

Table – II: CT scan Findings of the Study Population (*n*=30)

Characteristics	Frequency (n)	Percentage (%)
Normal	6	20.0
acute infarcts in both cerebral hemisphere & deep white matter chronic ischemic change	1	3.3
acute infarct in right cerebellar hemisphere, lacunar infarct left hemipons	1	3.3
acute left sided intracerebellar hemorrhage	1	3.3
acute right thalamic and right cerebellar infarcts, old lacunar infarcts & atrophy.CA+CMI	1	3.3
acute subarachnoid hemorrhage	1	3.3
encephalomalacia change & mild cerebral atrophy, sequel of perinatal asphyxia	1	3.3
lacunar infarcts at right thalamus & both basal ganglia, CA+CMI	1	3.3
large infarcts at temporo-occipito-parietal lobe, Sinusitis	3	10.0
left sided large subacute subdural hematoma	1	3.3
mild cerebral atrophy	1	3.3
no significant intracranial abnormality	1	3.3
no significant intracranial abnormality, left sided oto-mastoiditis	1	3.3
no significant intracranial abnormality, mild sinusitis	1	3.3
normal brain, right maxillary & bilateral ethmoid sinusitis	1	3.3
old infarct at left occipital lobe, both basal ganglia, corona radiata, left frontal lobe, CA+CMI	1	3.3
recent infarct at left internal capsule, Bilateral old lacunar infarcts, Sinusitis	3	10.0
recent right sided cerebral infarct involving corpus cellular. CA+CMI	1	3.3
small hemorrhage at left temporal lobe	1	3.3
small infarcts in both basal ganglia and corona radiata, mild cerebral atrophy	1	3.3
Not done	1	3.3

DISCUSSION

The present observational study evaluated the CT scan findings in patients presenting with headache and weakness at M.A Rashid Hospital, Jamalpur, Bangladesh. The study provides a detailed analysis of the demographic characteristics, clinical history, and imaging results of these patients. Our findings offer valuable insights into the prevalence and types of intracranial abnormalities detectable through CT imaging, and allow for a comparative analysis with existing literature. The study population had a mean age of 48 years, with a male predominance (63.3%), which is consistent with other studies that have documented similar demographic patterns in patients with headache and neurological symptoms[19,20]. A notable clinical history among our patients included hypertension (20.0%), diabetes mellitus (3.3%), and a history of trauma (3.3%). These findings align with previous studies that have highlighted hypertension and diabetes as significant risk factors for cerebrovascular events[3]. Headache was the most common symptom reported by 70.0% of our patients, followed by general or localized weakness in 53.3%

of cases. These symptoms are frequently observed in patients with intracranial pathology, as demonstrated by Stone and Evans, who reported similar symptom prevalence in their cohort of patients with functional neurological symptoms and headaches[21]. Additional symptoms in our study, such as slurring of speech, vertigo, and convulsions, further underscore the complexity and varied presentation of neurological disorders. The CT scan findings revealed a range of abnormalities. Notably, 20.0% of the scans were normal, a result that mirrors findings by Halim et al., who reported a high prevalence of normal CT scans in patients presenting with headaches but without focal neurological signs[22]. This underscores the necessity of thorough clinical evaluation to avoid unnecessary imaging. Significant CT findings in our study included acute infarcts, hemorrhages, and chronic ischemic changes. Acute infarcts in both cerebral hemispheres and deep white matter with chronic ischemic changes were found in 3.3% of patients, similar to findings reported by Alons et al., who emphasized the importance of identifying acute infarcts for timely intervention[7]. Additionally, lacunar infarcts at the right thalamus and both basal ganglia with chronic microangiopathy (CMT) were observed in another 3.3% of patients, a finding that aligns with studies on small vessel disease and its cognitive implications [23]. We also identified a variety of other significant findings, including large infarcts at the temporo-occipito-parietal lobe combined with sinusitis in 10.0% of cases, and a left-sided large subacute subdural hematoma in 3.3% of patients. Such findings highlight the diversity of intracranial pathologies that can present with similar clinical symptoms. The correlation between sinusitis and neurological symptoms has been explored by Mudgil et al., who found that sinus CT findings often do not correlate with the clinical presentation of facial pain or headache [24]. Furthermore, we noted that encephalomalacia changes and mild cerebral atrophy were present in some patients, indicative of chronic or past neurological insults. This is consistent with studies that have linked cerebral atrophy with both ischemic and hemorrhagic events in the brain [25]. Additionally, the presence of old lacunar infarcts and recent infarcts combined with sinusitis in our patients emphasizes the multifactorial nature of these conditions. The comparative analysis of our findings with existing literature underscores the critical role of CT imaging in the diagnosis and management of patients with neurological symptoms. Although MRI provides superior detail, CT remains a valuable tool due to its accessibility and speed, especially in emergency settings. Studies by Wittkopf et al. and Agius have similarly highlighted the utility of CT in detecting clinically significant abnormalities in patients with sinusitis and neurological symptoms[26,27]. In conclusion, this study provides a comprehensive overview of the CT scan findings in patients presenting with headache and weakness. The demographic characteristics, clinical history, and diverse imaging results underscore the complexity of diagnosing and managing such patients. Our findings align with existing literature and emphasize the need for a multidisciplinary approach to effectively address these conditions. Future studies should aim to further elucidate the diagnostic accuracy and clinical utility of CT imaging in similar patient populations.

Limitations of The Study
The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION
This observational study provides valuable insights into the demographic characteristics, clinical history, and CT scan findings of patients presenting with headache and weakness at a peripheral secondary care Hospital in Bangladesh. The results underscore the significant role of CT imaging in diagnosing a variety of intracranial abnormalities, including infarcts, hemorrhages, and chronic ischemic changes. The findings align with existing literature, highlighting the prevalence of these conditions and the importance of timely and accurate imaging for effective patient management. Despite the predominance of normal scans in some cases, the presence of critical findings in others underscores the necessity of thorough clinical evaluation and judicious use of imaging. Future research should focus on enhancing diagnostic protocols and integrating advanced imaging techniques to improve patient outcomes.

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