

## Frequency of Common Computed Tomography Findings among Clinically Undiagnosed Patients of Acute Severe Headache

NADEEM ULLAH<sup>1</sup>, MUHAMMAD USMAN<sup>2</sup>, KAUSAR SHAH<sup>1</sup>

<sup>1</sup>Department of Radiology, <sup>2</sup> Department of Neurosurgery “A”, Lady Reading Hospital MTI Peshawar – Pakistan

### ABSTRACT

**Introduction:** Headache is the commonest neurological symptom seen in general practice. Lifetime headache in general population of UK is over 90% prevalent. The most common cause of such headaches is sub arachnoid hemorrhage. Early and accurate recognition and diagnosis of such headaches is very important as it is indicative of serious underlying disorder.

**Objective:** To determine the frequency of common computed tomography (CT) findings among clinically undiagnosed patients of acute severe headache.

**Materials and Methods:** There were 203 CT scan of clinically undiagnosed patients of acute severe headache, performed after consent from the patients. All the CT reporting were done by single experience radiologist and findings were recorded. The study was designed as Cross sectional descriptive study from February 2017 to September 2017 at department of Radiology, Lady Reading Hospital Peshawar.

**Results:** Out of total 203 patients, male to female ratio was 0.87:1. Average age of the patients was 35.38 ± 10.83 years with age range of 18-60 years. The commonest radiological finding was sub arachnoid hemorrhage which was observed in 49 (24.1%) patients.

**Conclusion:** CT finding shows that sub arachnoid hemorrhage was found in majority of clinically undiagnosed patients of acute severe headache.

**Key Words:** Sub arachnoid hemorrhage, Cerebral vein thrombosis, Unruptured aneurysms, computed tomography, severe headache.

### INTRODUCTION

Headache is the commonest neurological symptom seen in general practice<sup>1</sup>. Lifetime, headache in general population of UK is over 90% prevalent. In emergency department up to 4.5% of the patients are presented with headache.<sup>2</sup> An acute severe headache is often a sign of some underlying life threatening disorder<sup>3</sup>. The most common cause of such headaches is sub arachnoid hemorrhage<sup>4</sup>. Other common causes associated with such headaches include cerebral venous thrombosis, un-ruptured intracranial aneurysm, hypertensive reversible posterior leuko-encephalopathy and pituitary apoplexy<sup>5</sup>. It can also be present as a rare manifestation of cerebral or cerebellar

infarct<sup>6</sup>. Due to increase utilization of cerebral imaging techniques list of potential causes is rapidly growing<sup>7</sup>.

Early and accurate recognition and diagnosis of such headaches is very important as it is indicative of serious underlying disorder<sup>8</sup>. There are certain characteristics which when present indicate that presence of acute severe headache is the result of some serious or life threatening disorder. Such characteristics are called as red flag symptoms. These red flag symptoms include onset of new or different headache in patients above 50 years of age, headache associated with abnormalities on neurological examination, headache which starts and become severe in minutes, headache associated with visual loss or

abnormalities and headaches in patients having fever and neck stiffness. Headache in patients with AIDS, cancers or increased risk of thrombosis are also included in red flags.<sup>9</sup> The presence of any one of above mentioned symptoms indicate that further investigation of these patients must be carried out<sup>10</sup>.

A study carried out at Saidu Teaching Hospital in 2006, revealed frequency of patients attending casualty department with complain of thunderclap headache their diagnostic outcome and follow up, showed that out of 120 patients with complain of thunder clap headache, 20 (15.6%)<sup>10</sup> turned out to have sub arachnoid hemorrhage.

The current study is designed in order to determine the magnitude of common CT findings among patients presenting with acute severe headache clinically remaining undiagnosed. This type of study is not yet conducted in our local population and the pervious literature available on CT findings most of which is based upon retrospective data<sup>11,12</sup>. Also, to my knowledge, previous studies have not focused on combination of such findings together in one study and even no study has been found over literature in which the inclusion will be based upon clinically undiagnosed patients of headache. Our study will be first of its kind among local adult population and the results of this study can be used to identify further recommendations or suggestions in the treatment of patients who present with acute onset severe headache and also the role of CT in the investigation of choice at first presentation of such patients.

## **MATERIAL AND METHOD**

Permission were taken from hospital ethical committee before starting the study. Total sample size of 203 patients were taken with help of proportion 15.6%<sup>10</sup> turned out to have sub arachnoid hemorrhage, 95% confidence level 5% margin of error using WHO calculator. All the patients referred to the Department of Radiology with complains of acute severe headache and clinically remaining undiagnosed were included in the study. Also informed consent were taken from all patients.

Patients with history of already diagnosed CNS disorder on either CT scan or MRI, confused or have altered mental state, Patients with history of trauma in the last two months and Patients with bleeding

disorders on history and medical records were seems to act as confounder so such patients were excluded.

All examinations were carried out on single slice, single detector, Helical Toshiba Asteion machine with gantry model-CGGT-013B with tube current of 200mA and tube voltage of 120KV. All the CT reporting were done by single experience radiologist fellow of CPSP. Data of the patients were collected to fill up especially designed proforma. Exclusion criteria had strictly followed to avoid any confounder and make the study results unbiased. The data so collected were analyzed by the SPSS version 17.

## **RESULTS**

A total of 203 patients presenting with clinically undiagnosed of acute severe headache were included in the study. There were 95 (46.8%) males and 108 (53.2%) females. Male to female ratio of 0.87:1.

Average age of the patients was  $35.38 \pm 10.83$  years with age range of 18-60 years. The age distribution of the patients was divided in four categories, most common age group presenting with clinically undiagnosed patients of acute severe headache was 21-35 years. In age group of less than or equal to 20 years, there were 16 (7.9%) patients, 93 (45.8%) in the age range of 21-35 years, 69 (34%) were of age 36-50 years and 25 (12.3%) patients were more than 50 years of age.

The most common finding was sub arachnoid hemorrhage which was observed in 49 (24.1%) patients followed by unruptured Aneurysms 27 (13.3%) and cerebral vein thrombosis was noted in 11 (5.4%) patients (Figure 1).

Age wise distribution of CT findings shows that most of findings were found in old age group but statistically these were insignificant (Table 1).

Gender wise common findings of CT in patients presenting with clinically undiagnosed of acute severe headache shows that gender has influence on these findings. There were 14.7% of sub arachnoid hemorrhage in male and 32.4% in female patients. Cerebral Vein thrombosis was observed 3.2% in male and 7.4% in female patients. Unruptured Aneurysms were 10.5% in male and 15.7% in female. Sub arachnoid hemorrhage was significantly higher in female as that of male with p-value = 0.003 (Table 2).

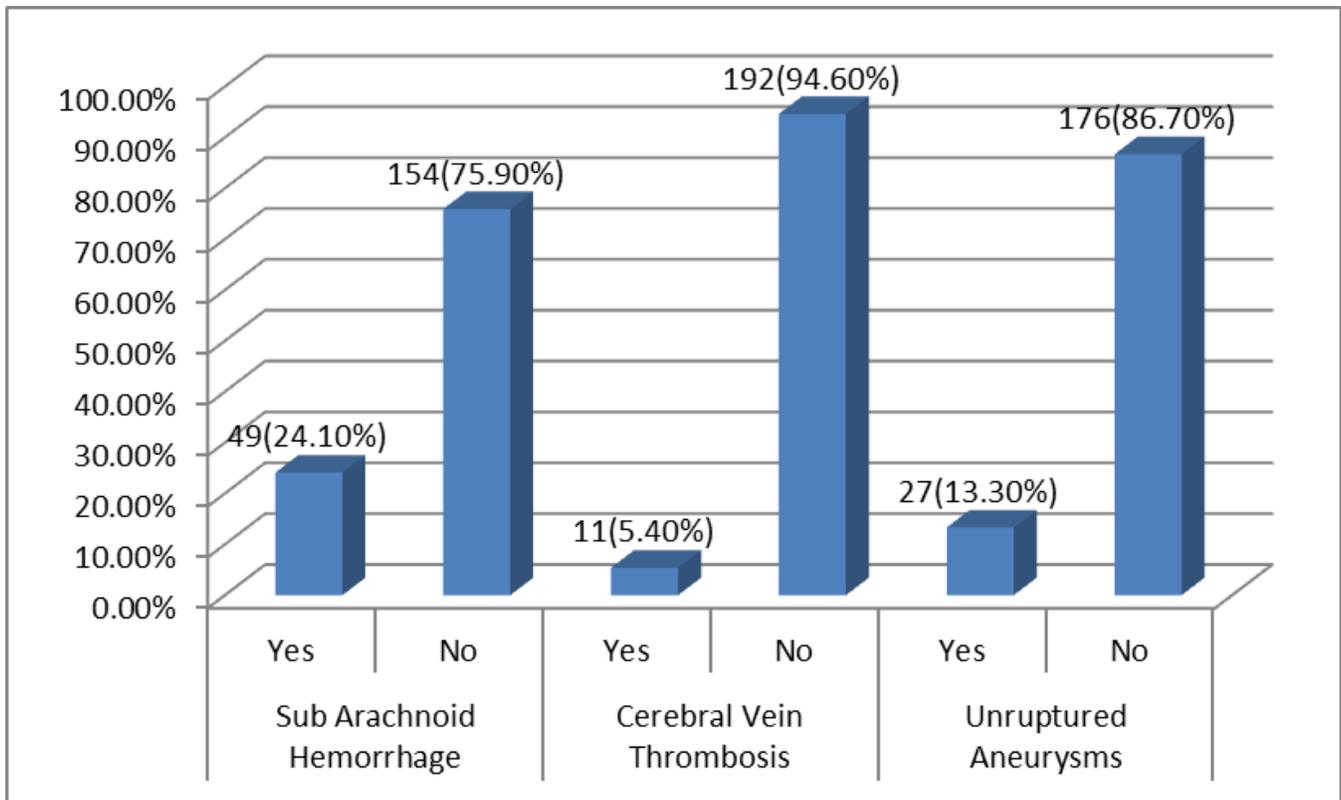


Fig. 1: Common Computed Tomography Findings (n = 203).

Table 1: Age Wise Distribution of Computed Tomography Findings (n = 203).

		Age (in Years)				p-value
		<= 20	21 - 35	36 - 50	51 +	
Sub Arachnoid Hemorrhage	Yes	3 18.8%	22 23.7%	17 24.6%	7 28.0%	0.924
	No	13 81.2%	71 76.3%	52 75.4%	18 72.0%	
Cerebral Vein Thrombosis	Yes	1 6.2%	6 6.5%	1 1.4%	3 12.0%	0.217
	No	15 93.8%	87 93.5%	68 98.6%	22 88.0%	
Unruptured Aneurysms	Yes	2 12.5%	11 11.8%	10 14.5%	4 16.0%	0.935
	No	14 87.5%	82 88.2%	59 85.5%	21 84.0%	

**Table 2:** Gender Wise Distribution of Computed Tomography Findings (n = 203).

		Gender		p-value
		Male	Female	
Sub Arachnoid Hemorrhage	Yes	14 14.7%	35 32.4%	0.003
	No	81 85.3%	73 67.6%	
Cerebral Vein Thrombosis	Yes	3 3.2%	8 7.4%	0.182
	No	92 96.8%	100 92.6%	
Unruptured Aneurysms	Yes	10 10.5%	17 15.7%	0.275
	No	85 89.5%	91 84.3%	

**DISCUSSION**

Headache is considered to be one of the most common diseases of mankind. Headache is 11-48% prevalent in children<sup>13,14</sup> while, 6-71% in adults.<sup>15,16</sup> Whilst by migraine, sex, age, and case definition may principally relate for this variation.<sup>17</sup> When compared with Asian and South American countries, headache is more prevalent in North America and Europe<sup>18-20</sup>. Migraine headache is having obvious sex predilection, as it is more commonly affecting female 15 – 18% as compared to male 6%.<sup>16,21</sup>

In contrast the incidence of diseases exhibiting with headache is low. In the USA the incidence of brain tumours is 46 per 100,000, while its 9 per 100,000 for subarachnoid haemorrhage. In a study on brain tumours, 48% of the patients presented with headache and that figure is equal for primary as well as metastatic tumour.<sup>22</sup> The types of the headaches and their frequencies areas, tension in 77%, other types 14% and migraine 9%. Occasionally headache leads the diagnosis of brain tumor by numerous years, signifying a relationship instead of causality.<sup>23,24</sup>

It has been documented in a study that 95% of

adult female, while 91% of male had headache during 1-year period and interestingly only 18% female and 15% male consulted their doctor<sup>25</sup>. In the literature several retrospective studies mentioned high threshold of imaging in headache patients without neurological signs and symptoms.<sup>26,27</sup> In a prospective study of 293 CT scans documented that majority of the imaging was done because of suspicion of brain tumors (49%), SAH 9% and only 17% advised due to medico-legal concerns and patient expectation.<sup>28</sup>

It is documented in the literature that about 1-8% of the population is having intracranial aneurysm and of those the annual incidence of rupture is 4-10 patients/100,000<sup>29</sup>. A study found that there is 7% prevalence of cerebral aneurysm in a group of 8680 participants who undergone MR angiography.<sup>30</sup> However, the prevalence varies between different groups of patients, as it is 10.5% with positive family history and only 6.8% with no family history. Furthermore, the prevalence peaks to 42.1% in first or second degree relatives, when there is positive family history of SAH.<sup>30</sup>

Due to different causes the overall death of SAH is as high as that about 25-50% of the patients died within six months of the onset. While, one third of the patients who survived usually have neurological deficits affecting their daily activities and quality of life.<sup>31</sup> Consequently upon, the timely diagnosis of SAH is extremely imperative in patients of headache without neurological deficits. This type of patients can be challenging to diagnose, therefore, most have the chance to die due to lack or missing of proper diagnosis.<sup>32</sup>

**CONCLUSION**

The screening of those patients with remote, non-traumatic headache by doing CT Brain or MRI is usually not required. But for those patients who are at risk and having other types of headache the imaging may provide a positive finding, which helps in proper further management. The other headaches type are; headaches radiating to the neck, thunderclap headaches and temporal headaches in an older individual, where imaging may be beneficial. In our study, female gender and older ages are the factors where its CT detect its findings. These factors can further help to prevent mortality and morbidity in such cases.

Address for Correspondence: Dr. Muhammad Usman,  
Assistant Professor, Neurosurgery "A" Department,  
Lady Reading Hospital MTI, Peshawar – Pakistan  
Email: drusman387@yahoo.com  
Cell: +92 333 9150608

## REFERENCES

1. Linet MS, Stewart WF, Celentano DD, Ziegler D, Sprecher M. An epidemiologic study of headache among adolescents and young adults. *JAMA*. 1989; 261: 2211–6.
2. Solomon GD, Cady RK, Klapper JA, Ryan RE. Standards of care for treating headache in primary care practice. National Headache Foundation. *Cleve Clin J Med*. 1997; 64: 373–83.
3. David R. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Headache Classification Committee of the International Headache Society. *Cephalalgia*. 1988; 8 (suppl. 7): 1–96.
4. Solomon S. Diagnosis of primary headache disorders. Validity of the International Headache Society criteria in clinical practice. *Neurol Clin*. 1997; 15: 15–26.
5. Dalessio DJ. Diagnosing the severe headache. *Neurology*, 1994; 44 (5): S6–12.
6. Newman LC, Lipton RB. Emergency department evaluation of headache. *Neurol Clin*. 1998; 16: 285–303.
7. Morgenstern LB, Luna-Gonzalez H, Huber JC, Wong SS, Uthman MO, Gurian JH, et al. Worst headache and subarachnoid hemorrhage: prospective, modern computed tomography and spinal fluid analysis. *Ann Emerg Med*. 1998; 32 (3 pt 1): 297–304.
8. Vanderwee N, Rinkel GJ, Hasan D, van-Gijn J. Detection of subarachnoid haemorrhage on early CT: is lumbar puncture still needed after a negative scan?. *J Neurol Neurosurg Psychiatry*, 1995; 58: 357–9.
9. Evans RW. Diagnostic testing for the evaluation of headaches. *Neurol Clin*. 1996; 14: 1–26.
10. Dodick D. Headache as a symptom of ominous disease. What are the warning signals?. *Postgrad Med*. 1997; 101 (5): 46–50.
11. Davic GH. Physicians' desk reference. Mont-vale, N.J. Medical Economics, 2000.  
<http://physician.pdr.net/physician/static.htm?path=controlled/searchpdrindex.htm>.
12. Pruitt AA. Approach to the patient with headache. In: Goroll AH, May LA, Mulley AG Jr, eds. Primary care medicine office: evaluation and management of the adult patient. 3d ed. Philadelphia: Lippincott, 1995: 821–9.
13. Abu-Arefeh I, Russell G. Prevalence of headache and migraine in schoolchildren. *BMJ*. 1994; 309: 765–9.
14. Brattberg G. The incidence of back pain and headache among Swedish school children. *Qual Life Res*. 1994; 3 Suppl. 1: S27–31.
15. Gobel H, Petersen-Braun M, Soyka D. The epidemiology of headache in Germany: a nationwide survey of a representative sample on the basis of the headache classification of the International Headache Society. *Cephalalgia*. 1994; 14: 97–106.
16. Wong TW, Wong KS, Yu TS. Prevalence of migraine and other headaches in Hong Kong. *Neuroepidemiol*. 1995; 14: 82–91.
17. Lipton RB, Stewart WF. The epidemiology of migraine. *Eur Neurol*. 1994; 34 Suppl. 2: 6–11.
18. Kryst S, Scherl E. A population-based survey of the social and personal impact of headache. *Headache*, 1994; 34: 344–50.
19. O'Brien B, Goeree R, Streiner D. Prevalence of migraine headache in Canada: a population-based survey. *Int J Epidemiol*. 1994; 23: 1020–6.
20. Cruz ME, Cruz I, Preux PM. Headache and cysticercosis in Ecuador, South America. *Headache*, 1995; 35: 93–7.
21. Russell MB, Rasmussen BK, Thorvaldsen P. Prevalence and sex-ratio of the subtypes of migraine. *Int J Epidemiol*. 1995; 24: 612–8.
22. Forsyth PA, Posner JB. Headaches in patients with brain tumors: a study of 111 patients. *Neurol*. 1993; 43: 1678–83.
23. Purdy RA, Kirby S. Headaches and brain tumors. *Neurol Clin*. 2004; 22: 39–53.
24. Suwanwela N, Phanthumchinda K, Kaorophum S. Headache in brain tumor: a cross-sectional study. *Headache*, 1994; 34: 435–8.
25. Linet MS, Stewart WF, Celentano DD, Ziegler D, Sprecher M. An epidemiologic study of headache among adolescents and young adults. *JAMA*. 1989; 261: 2211–6.
26. Jordan JE, Ramirez GF, Bradley WG. Economic and outcomes assessment of magnetic resonance imaging in the evaluation of headache. *J Natl Med Assoc*. 2000; 92: 573–8.
27. Tsushima Y, Endo K. MR imaging in the evaluation of chronic or recurrent headache. *Radiol*. 2005; 235: 575–9.
28. Becker LA, Green LA, Beaufait D. Use of CT scans for the investigation of headache: a report from ASPN, Part 1. *J Fam Pract*. 1993; 37: 129–34.
29. Valença MM, Valença LPAA. Hemorragia subaracnóidea: causas, manifestações clínicas e tratamento. *Neurobiologia*. (Recife), 2000; 63: 97–104.
30. Kojima M, Nagasawa S, Lee Y-E, Takeichi Y, Tsuda E, Mabuchi N. Asymptomatic familial cerebral aneurysms. *Neurosurg*. 1998; 43: 776–781.
31. Hop JW, Rinkel GJ, Algra A, van Gijn J. Case-fatality rates and functional outcome after subarachnoid

---

**Frequency of Common Computed Tomography Findings among Clinically Undiagnosed Patients of Acute Severe**

hemorrhage: a systematic review. Stroke, 1997; 28: 660-4. 32. Weir B. Headaches from aneurysms. Cephalalgia. 1994; 14: 79-87.

**AUTHORS DATA**

<b>Name</b>	<b>Post</b>	<b>Institution</b>	<b>E-mail</b>	<b>Role of Authors</b>
Dr. Muhammad Usman	Assistant Professor	Department of Neurosurgery "A", Lady Reading Hospital MTI, Peshawar – Pakistan	drusman387@yahoo.com	Paper Writing
Dr. Nadeem Ullah		Department of Radiology, Lady Reading Hospital MTI, Peshawar – Pakistan		Literature Search
Dr. Kausar Shah			Tables and Graphs	

Date of Submission: 1-11-2018

Date of Printing: 15-12-2018