CORPUS PUBLISHERS

Current Research in Emergency Medicine (CREM)

ISSN: 2832-5699

Volume 3, Issue 2, 2023

Article Information

Received date : 24 May, 2023

Published date: 12 June, 2023

*Corresponding author

Khaloud Al-Shaaibi, Department of Emergency Medicine, Armed Forced Hospital, Muscat, Oman.

DOI: 10.54026/CREM/1054

Key Words

Dizziness; Vertigo; Lightheadedness; Presyncope; Anxiety; Imbalance; CT Brain; Stroke

Research Article

Prevalence of Stroke in Patient Presenting to Emergency Department (ED) With Dizziness Base on Brain Computed Tomography (CT)

Aleyah AL Obeidani (MD)[1], Khaloud Al-Shaaibi (MD, OMSB)[2*] and Tanzeela Mariam Shuja (MD)[3]

[1]*Department of Emergency Medicine, Oman Medical Specialty Board, Muscat, Oman*

[2]*Department of Emergency Medicine, Armed Forced Hospital, Muscat, Oman*

[3]*Intern, Oman Medical College, Sohar, Oman*

Abstract

Objectives: Dizziness is a common acute emergency complain which can present in isolation. Diagnosing a stroke in patient complains of dizziness only is major challenge to the practicing emergency physician as this symptom nor sensitive neither specific. The purpose of this study was to measure the prevalence of stroke as a diagnosis in patient who present to the emergency department with dizziness base on brain CT.

Methods: This is Retrospective, Cross sectional study was carried out at the Armed Force Hospital (adult ED) in Muscat, Oman, from between August 2019 -August 2020.

All patients who underwent head CT during this period where review both indication and the CT finding.

Result: out of 1000 CT brain request, 115 patients meet the inclusion criteria, and 13 patients from the inclusion criteria have stroke with isolated dizziness. 80% of brain CT was normal, while 11% showed acute stroke.

Conclusion: patient present with dizziness carry the risk to have stroke and head CT brain can help in diagnosis. Adding further imaging, such as, brain perfusion study and MRI can lower the chance of missing stroke case in isolated dizziness presentation.

Introduction

Dizziness is one of the most common challenging presenting complaints to the emergency departments (ED). In 2012, University of Chicago Medicine emergency department registered around 7.5 million visits with dizziness per year [1]. Some patients will complain of episodic attack that last for brief period. However, many patients will have persisted dizziness that last for days to weeks [2]. Several patients may refer to it as vertigo, lightheadedness, presyncope, anxiety, imbalance, or just not feeling well. It can be classified as vertigo, near syncope, disequilibrium, and nonspecific dizziness. Isolated vertigo can present acutely, recurrent episodes like vestibular syndrome, and as positional vestibular syndrome [3] Approximately more than fifty presents of the patients present with dizziness type vertigo [1]. Since most of the cases are benign (such as, benign paroxysmal positional vertigo [BPPV] and vestibular neuritis), differentiating it from a major vascular event remains a big challenge ED. 3.2% of all dizziness or vertigo presentations in ED found to have stroke. Yet, these patients that discharge from ED will have double risk to developed stroke or cardiovascular event compared to general population in the subsequent 3 years [3].

Worldwide, strokes cause permanent serious disability and even death. Previous studies have illustrated that patients presenting with dizziness as isolated symptom is less likely to be diagnosed with cerebrovascular accident (CVA) [4-6]. Around 20% of patients with brainstem stroke have isolated vertigo attacks [7]. In general patients with isolated vertigo are at high risk to have CVA compare to general population [8]. In the United States missing strokes diagnosis is considered top common physician - reported errors and closed malpractice claims [9]. In 2019, a meta-analysis study showed that 9% of all CVA are misdiagnosed in ED specially if presented with nonspecific symptoms [10]. While, overdiagnosis of vascular vertigo may result in unnecessary expensive investigation and medication.

In most cases, CT initially ordered to exclude a central cause of acute onset of dizziness. It's usually considered for those who have a high likelihood of developing stroke or have symptoms suggestive of central vertigo. In 2012, a study done to evaluate the utility of head CT in evaluating dizziness, it has been found that CT have a low diagnostic yield for isolated symptoms [4]. While Magnetic Resonance Imaging (MRI) known to have superior sensitivity for both posterior fossa pathology and for ischemic strokes [1]. In fact, clinical diagnosis of acute vertigo from strokes is superior to neuroimaging [3, 9]. The bed side neuro-otologic testes including direction-changing nystagmus and head impulse are appropriate examinations for narrowing down acute vertigo diagnosis [11]. Doctors should always use their clinical judgment in predicting serious causes of dizziness.

This research project will provide an overview of the prevalence of stroke among patients presenting to ED with dizziness based on head CT. Overall, this research intended to highlight the overuse of CT in ruling out stroke in patient presenting to ED with isolated dizziness. In addition, the study will have a constructive influence in selecting patient that need CT head. For instances, the results of this research can be used in supporting or modifying hospital dizziness approaching guidelines and policies. Finally, there is no local similar study was conducted according to the researcher knowledge.

Methods & Materials

This is Retrospective, Cross sectional study was carried out at the Armed Force Hospital adult ED in Muscat, Oman, from between August 2019 -August 2020. All brain CT imaging ordered from the ED to rule intracranial insult. The investigator reviewed all brain CT indications and the radiology reports during this period. All the data used anonymously for the study purposes, no personal information of participant neither patients were disclosed.

Inclusion criteria: All research candidates are older than 18 years patients which present to ED with dizziness and needed head CT to rule out stroke. Patients who have previous stroke were included also, to rule out new brain insult.

Exclusion criteria: studies were excluded patient if there are less than 18 years old. And if present with motor or sensory deficit indicate CVA. In addition, candidate who brought CT brain scan report from other health services or referred from other health services for head CT were exclude.

Data collection: data were collected retrospectively using a designated data collection sheet. Research assistant were assigned to record the eligible candidates in data sheet. He/She was trained in how to do so.

Data analysis: the data analyzed using SPSS sheet was used to analyze the data. The estimated Sample size calculated with the help of a statistician and found to be 630 with confident interval of 97%. The calculation was based on the anticipated prevalence of stroke 3.7%, with margin of error 1 % [3]. The main question is to measure the prevalence of stroke in patients present with dizziness alone.

Results

From a 1000 brain CT screen, 115 patients meet the inclusion criteria, and 13 patients from the inclusion criteria have stroke with isolated dizziness (Figure 1).

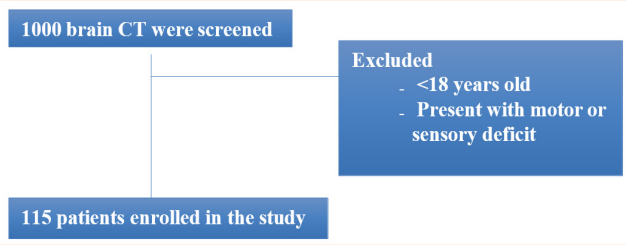


Figure 1: Study population analysis

Approximately, 70% of the study population are male, whereas 47 female patients were in enrolled. The findings of this study show that most of the patient have multiple comorbidities and complain of nonspecific associate symptoms like headache and nausea. Around 80% present with isolated dizziness and has normal CT head scan. On the other hand, only 11% of CT head showed acute stroke.

Table 1: Study population characteristics

Variable	n (%)
Sex	
Male	68 (59.1)
Female	47 (40.9)
Age, mean ±SD	58.94±15.11
Age group	
<45 years	24 (20.9)
45-65 years	48 (41.7)
>65 years	43 (37.4)
Past Medical History	
Yes	89 (77.4)
No	26 (22.6)
Associated symptoms	
Yes	75 (65.2)
No	40 (34.8)
CT findings	
Normal	93 (80.9)
Abnormal but not stroke	9 (7.8)
Stroke	13 (11.3)

Males presented to the emergency department with dizziness as chief complaint are more prone to be diagnosed with stroke compared to female patients. Whereas other variable like age, past medical history and associated symptoms are not statistically significant in suspecting stroke in patients with dizziness.

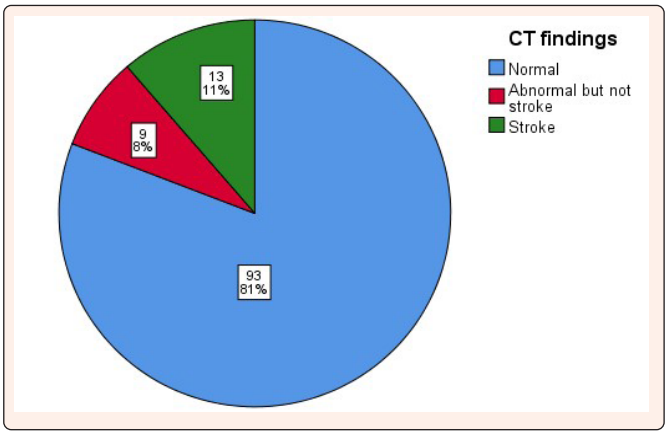
Table 2: Correlations characteristic variable and radiological finding

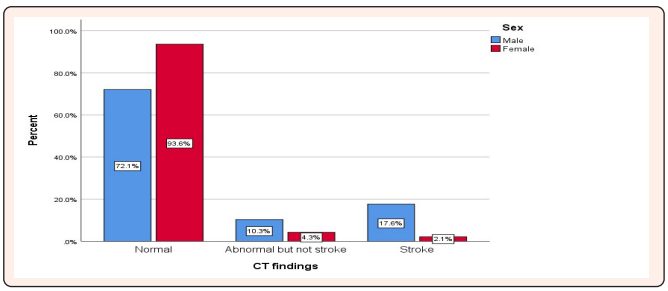
	CT Findings			
	Normal	Abnormal but not stroke	Stroke	
Variable	**n (%)**	**n (%)**	**n (%)**	**value**
Sex				
Male	49 (72.1)	7 (10.3)	12 (17.6)	
Female	44 (93.6)	2 (4.3)	1 (2.1)	0.006*
Age group				
<45 years	18 (75.0)	4 (16.7)	2 (8.3)	
45-65 years	(85.4) 34	3 (6.3)	4 (8.3)	
>65 years	79.1	2 (4.7)	7 (16.3)	0.366
Past Medical History				
Yes	71 (79.8)	6 (6.7)	12 (13.5)	
No	22 (84.6)	3 (11.5)	1 (3.8)	0.263
Associated symptoms				
Yes	61 (81.3)	7 (9.3)	7 (9.3)	
No	32 (80.0)	2 (5.0)	6 (15.0)	0.499

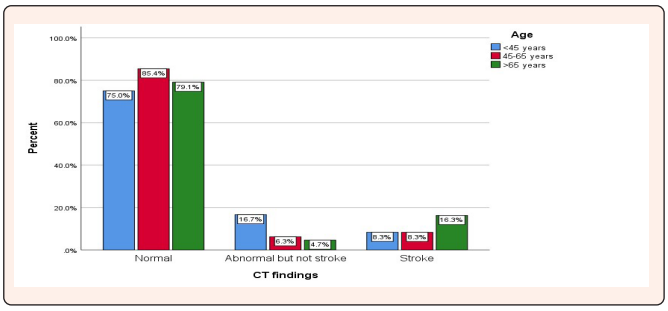
**Statistically significant, Test: Likelihood ratio test*

Discussion

This study aims to explore the occurrence of stroke in patient presenting to AFH. ED with dizziness base on brain CT. The number of subjects that participates in the study are 115, which consist of 68 males and 47 females. Only 13% of the participants' CT head has showed stroke. The proportion of stroke was the highest among males compared to females. There is no clear evidence or correlation between these parameters (age, past medical history, and associated symptoms) and the occurrence of stroke in dizzy patients. On other hand, a previous cross-sectional study showed that diabetic mellitus patients pose an independent risk factor that increased the risk of stroke compared to general population [4]. Early recognition of dizziness secondary to CVA will facilitate providing the definite treatment in the appropriate time. A prior study revealed that the occurrence of CVA in patients with dizziness ranges from 3.2~25% [4]. The present study showed that 11% of dizziness secondary to stroke. These two outcomes support the study hypothesis, but future studies to confirm these findings should include a larger sample size than that achieved for this study. The results illustrated that 8% of head CT scan revealed abnormal findings like hematoma and metastasis. This data supports the commentary of other academics that stated that dizziness present in isolation can be misinterpreted into stroke [4-6]. Hence, to make stroke diagnosis in these patients are a challenge, and it might lead to unnecessary exposure to radiation and medication. It should be noted that the slight difference between these two results could be influenced by external variables such as the sample size and the population type.







List of Abbreviations

CT: computed tomography
ED: emergency department
AFH: Armed Force Hospital

This study is a single center design which is considered a limitation, because it is difficult to determine if the patient sample from one hospital accurately reflects the local community. In addition, a sample may have underestimated the percentage of stroke correlated with isolated vertigo. Furthermore, the research is dependent on the recorded data by the attending doctor that treated the patient. As a result, the quality recorded data may affect the prevalence of stroke among patients presented with dizziness. However, this bias could be excluded by reviewing progress clinical note. In addition, other types of imaging were not evaluated and the factors affecting the clinical reporting were not focused on, due to this further limitation studies are needed. This research raises the importance of keeping the high suspicion of stroke diagnosis in acute dizziness, and to do the head CT scan to rule out stroke. In Fact, 9% of CVA in emergency department missed the initial diagnose of stroke according to systematic review which involved 15,721 patients [10].

Conclusion

The aim of the current study was to provide information on the prevalence of CVA in CT head among patients who complained of dizziness. Our findings showed some similarities to international studies' results which provide a good basis for the further development of research in this field. Understanding the true dimension of stroke with dizziness presentation in Oman ED, will improve diagnostic services. Adding further imaging, such as, brain perfusion study and MRI can lower the chance of missing stroke case in isolated dizziness presentation.

Conflict of interest: The authors received no financial support in connection with this work.

Funding: None

Acknowledgment: Mr. Sachin Jose, Statistical Specialist, Studies and research section, OMSB who helped in sample size calculation and data analysis.

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