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Evaluation of Giddiness with Mri

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ABSTRACT

To evaluate the role of magnetic resonanceimaging in diagnosing the cause of giddiness is a common presenting complaint of patients. MRI scan of these patients is don e to look for possible treatable definitive cause. Out of 106 MRI scans, 83% of the cases had significant MRI findings that are known to cause giddiness and 17 % of the cases had normal MRI scan. Most common finding was small vessel ischemic changes in 26.3% of the scans. Spectrum of other findings included cerebral atrophy, PCA & non -PCA territory infarcts MRI is a highly sensitive investigation to find out the cause of giddiness. Its benefit weighs more than its cost. So the patients with persistent giddiness must undergo MRI brain to find the cause and for further appropriate management.

Keywords: Giddiness, anticonvulsants, neuroma and multiple sclerosis.

1. INTRODUCTION

Giddiness is a non-specific symptom or feeling that includes sensations such as faintness, light headedness, vertigo and imbalance. It is scientifically termed as “dizziness” which means impairment in spatial perception and stabilityasdefinedin Dorland's Medical Dictionary. Giddiness is reported in about 20 – 30% of the population at some point inthe year 2009[1-6]. Multiple parts of the body are required for maintaining balance including the inner ear, eyes, muscles, skeleton and the nervous system, so any disorder or disease in these systems can manifest as what is commonly referred to asgiddiness[7-12].

Commonphysiological causes of giddiness include inadequate bloodsupply tothebraindue to a sudden fall in blood pressure or arterial blockage, loss or distortion of vision or visual cues, disorders of the inner ear, distortion of brain/nervous function by medications such as anticonvulsants and sedatives[13-

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[15]. Differential diagnosis of many conditions are associated with giddiness. The most common causes are as follows: 40% peripheral vestibular dysfunction, 10% central nervous system lesion, 15% psychiatric disorder, 25% presyncope / dysequilibrium, and 10% nonspecific giddiness [16-21]. Conditions that often present as giddiness or have giddiness as a symptom include: benign paroxysmal positional vertigo, Meniere's disease, vestibular neuronitis, labyrinthitis, otitis media, braintumor,acoustic neuroma, chronic motion sickness, Ramsay Huntsyndrome,migraine, multiple sclerosis, pregnancy, low blood pressure(hypotension), low blood oxygen content (hypoxemia),myocardialinfarction, iron deficiency (anemia), low bloodsugar (hypoglycemia), hormonal changes (e.g., thyroid disease, menstruation, pregnancy), panic disorder, hyperventilation, anxiety, depression, age-diminished visual, balance and perception of spatial orientation abilities [22 -25].

Giddinessisacommon presenting symptom inmedicineand otorhinolaryngology outpatient departments. Most patients with giddiness often have difficulty describing their symptoms, therefore determiningthecause can be challenging.[26]An evidence-based approach using knowledge of key history, physical examination and radiologic findings for the causes of giddiness can help establish a diagnosis and consider appropriate treatments in most cases. When the symptom is refractory to medications, patients areinvariablyreferred for magnetic resonance imaging studies (MRI) of Brain. Magnetic resonance imaging (MRI) has been shown to have potential to diagnose or to rule out conditions that present as giddiness.[27-19]MRI has superior resolution to other cross-sectional imaging techniques like computed tomography for visualization of posterior fossa of brain where most central nervous system disease that causes giddiness are present. The aims of this study were to record the findings in patients who underwent MRI brainfor giddiness as the presenting symptom and toanalyzethe sensitivity of MRI in diagnosing the cause ofgiddiness.[30]

2. MATERIALS ANDMETHODS

Source ofdata:

The study was conducted in patients who presented with complaint of giddiness (dizziness, vertigo, light headedness, imbalance) and referred for MRI to the Department of Radio Diagnosis at Sree Balaji Medical College and

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Hospital, Chennai 600044. Majority of the referred cases were those who complaint of vertigo with neurologic signs and symptoms, risk factors for cerebrovascular disease, or progressive unilateral hearingloss.

Inclusion Criteria

Patients with complaint ofgiddiness and Patients willing to undergo thisstudy.

Exclusion Criteria

Patients not willing to undergo thisstudy, Pregnancy and Claustrophobicpatients

Method of collection of data

This study involved patients referred to the department of Radio diagnosis for MRI scan for giddiness at Sree Balaji Medical College andHospital.

- A total of 106 cases were taken up for thestudy.
- Clinical assessment was done including detailed history, physical examination and laboratory investigations for the causes ofgiddiness.

Magnetic resonance imaging of brain was performed with HITACHI APERTO lucent machine using 8 channels transmit-receive torso phased-array coil. The following sequences were obtained:

1. Scout: 3 plane localizer – axial, coronal andsagittal.
2. Axial Tl-weighted spin echo images from the foramen magnum to vertex (TR/TE 400 -640 ms/10-14 ms, slice thickness 4 mm, gap 1-1.2 mm, field of view 20 cm, NEX 1 -2, matrix 256x256).
3. Axial T2-weighted spin echo images from the foramen magnum to vertex (TR/TE 4000 -6000 ms/90-110 ms effective, slice thickness 4 mm, gap 1 - 1.2 mm, field of view 20 cm, NEX 1-2, matrix256x256).
4. Axial T2-weighted FLAIR images from the foramen magnum to vertex (TR/TE/TI 10500 -11000ms/90-110ms/2000ms

   effective, slice thickness 4 mm, gap 1 -1.2 mm,field of view 20 cm, NEX 1-2, matrix256x256).

5.Coronal T2 FLAIR (TR/TE/TI 10500-11000ms/90-110 ms/2000ms effective, slice thickness 4 mm, gap 1 -1.2 mm, fieldofview20cm,NEX1-2,matrix256x256).

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6. Sagittal T1(TR/TE 400 -640 ms/10-14 ms, slice thickness 4 mm, gap 1-1.2 mm, field of view 20 cm, NEX 1 -2, matrix 256x256).
7. FIESTA (Fast Imaging Employing Steady – Stateacquisition)
8. DW/ADC EPI based in axial plane (TR/TE 7200 -7500ms/120- 130 ms effective, slice thickness 4 mm, gap 1 -1.2 mm, field of view 20 cm, NEX 1 - 2, matrix256x256).
9. MRA(TR/TE 42 ms/7ms effective, FA- 33 degree, slice thickness 1-1.2 mm, gap 1-1.2mm, field of view 16 cm, NEX 1-2, matrix256x256).
10. MRV (TR/TE 35ms/8 ms effective, FA- 60-degree, slice thickness 3-3.5mm, gap 2.2 mm, field of view 22 cm, NEX 1 - 2, matrix256x256).

For contrast enhancement, imaging was performed following intravenous injection of 0.1 mmol/kg of gadolinium.

Studyperiod: MARCH 2017 - OCTOBER2018

RESULTS AND OBSERVATION

Table 1: Age distribution of the patients

Age in years	**Number**	**%**
0-20	**6**	**5.66%**
21-40	**34**	**32.08%**
41-60	**35**	**33.02%**
61-80	**28**	**26.42%**
81-100	**3**	**2.83%**
Mean +/- SD	**49.2 +/- 18.6**	

In the study group, majority of the cases ie., 33% belong to the age group 41-60 years, 32 % belong to the age group 21 - 40 years, 5.6 % belong to the age group 0 -20, 2.8 % belong to the age group 81-100years.

Figure 1: shows the MASTOIDITIS

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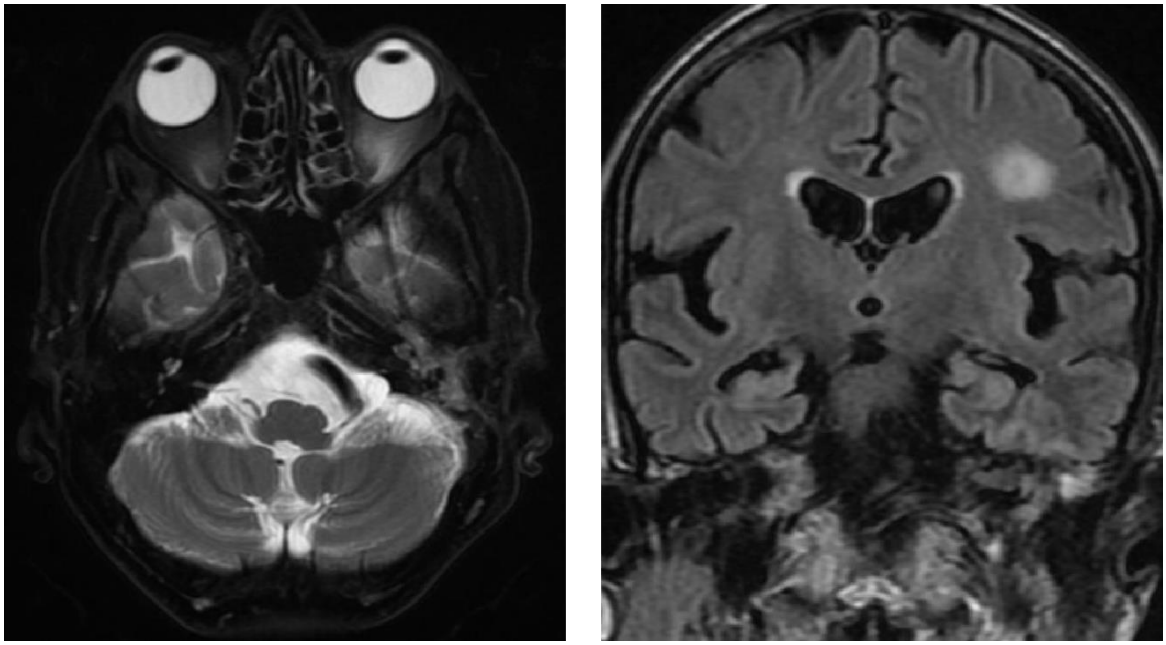
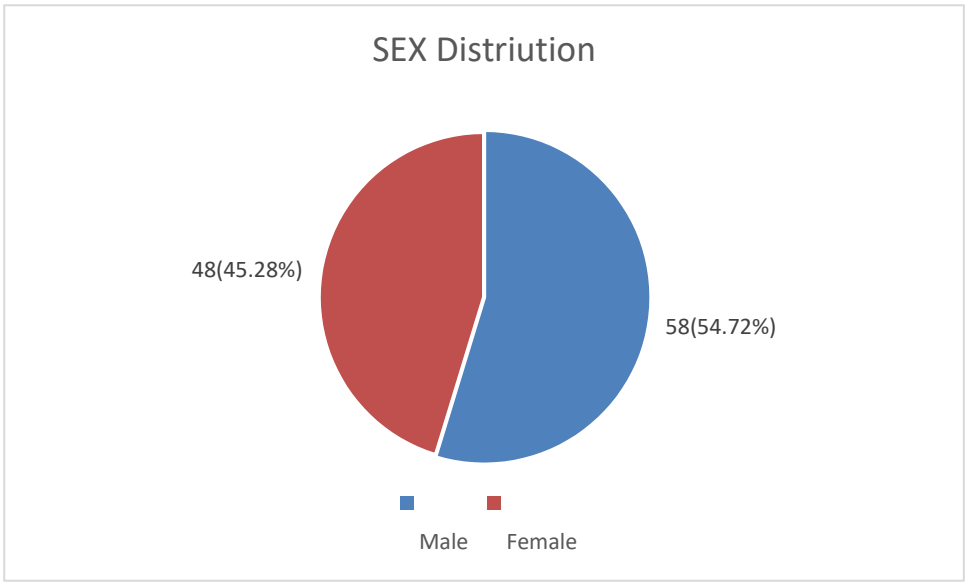


MRI T2W axial, T2 FLAIR coronal section of the brain showing mucosal thickening and fluid signal in left mastoid air cells with a subacute infarct in left frontal region.

Figure 2: SEX distribution of the patients



Among the total cases, 58 (54%) were males and 48(45%) were females out of which significant MRI findings were found in 50 males and 38females.

Table 2: Distribution of MRI findings in patients complaining of giddiness

S. No.	MRI Findings	No.of Cases	Percentage

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1.	Semi-circular canal dehiscence	8	4.68%
2.	CP angle tumors	5	2.92%
3.	Mastoiditis	8	4.68%
4.	Posterior cerebral territory infarct	25	14.62%
5.	Cerebral atrophy	27	15.79%
6.	Small vessel ischemic changes	45	26.32%
7.	Venous sinus thrombosis	5	2.92%
8.	Vertebral artery stenosis/occlusion	1	0.58%
9.	Vertebrobasilar dolichoectasia	1	0.58%
10.	Benign intracranial hypertension	2	1.17%
11.	SOL (Space occupyinglesion)	5	2.92%
12.	Intracranial hemorrhage	6	3.51%
13.	Non PCA territoryinfarct	13	7.60%
14.	Meningoencephalitis	1	0.58%
15.	Hypoxic ischemicencephalopathy	1	0.58%
16.	Normal	18	10.53%
	Total	**106**	**100**

MRI scans of 106 patients were analyzedand total 171 findings were seen that are known to cause giddiness. Out of 106 cases the most common finding on MRI was cerebral small vessel ischemic changes found in 45(26.3%) scans. 27(15.7%) scans had cerebral atrophy, 25(14.6%) patients had PCA terri tory infarct, 8(4.6%) scans had semicircular canal dehiscence, 8(4.6%) patients had mastoiditis and 5(2.9%) scans had CP angletumors.

Other findings that were found includesintracranial hemorrhage found in 6(3.5%) scans, SOL found in 5(2.9%) scans, venous sinus thrombosis in 5(2.9%) scans and benign intracranial hypertension in 2(1.1%) scans. Overlap offindings in same scan was noted in manycases.

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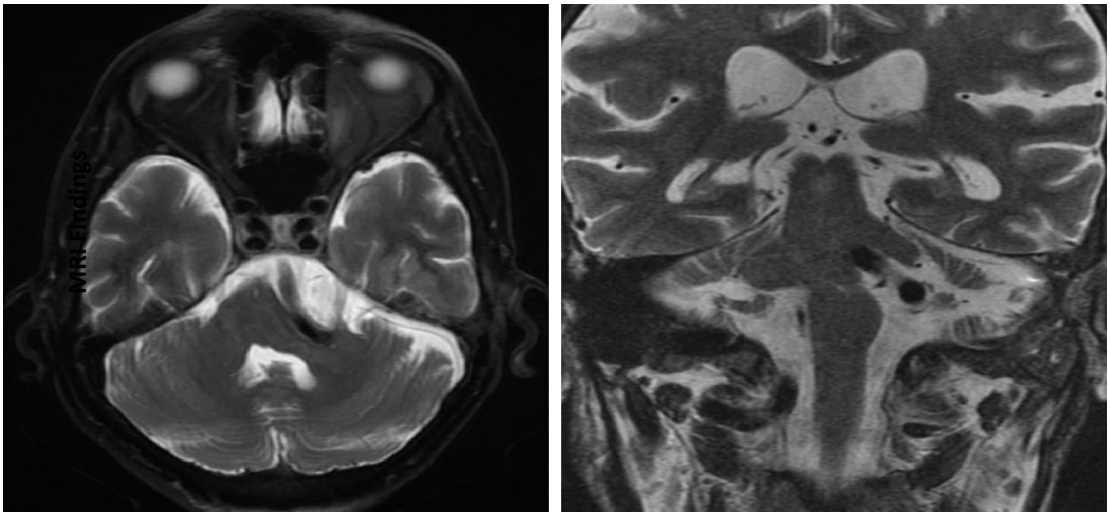
Figure 3: VERTEBROBASILAR DOLICHOECTASIA



MRI T2W axial and coronal section of the brain showing dilated and tortuous V4 segment of left vertebral artery compressing over the left hemipons.

Figure 4: Distribution of MRI findings in patients complaining of giddiness

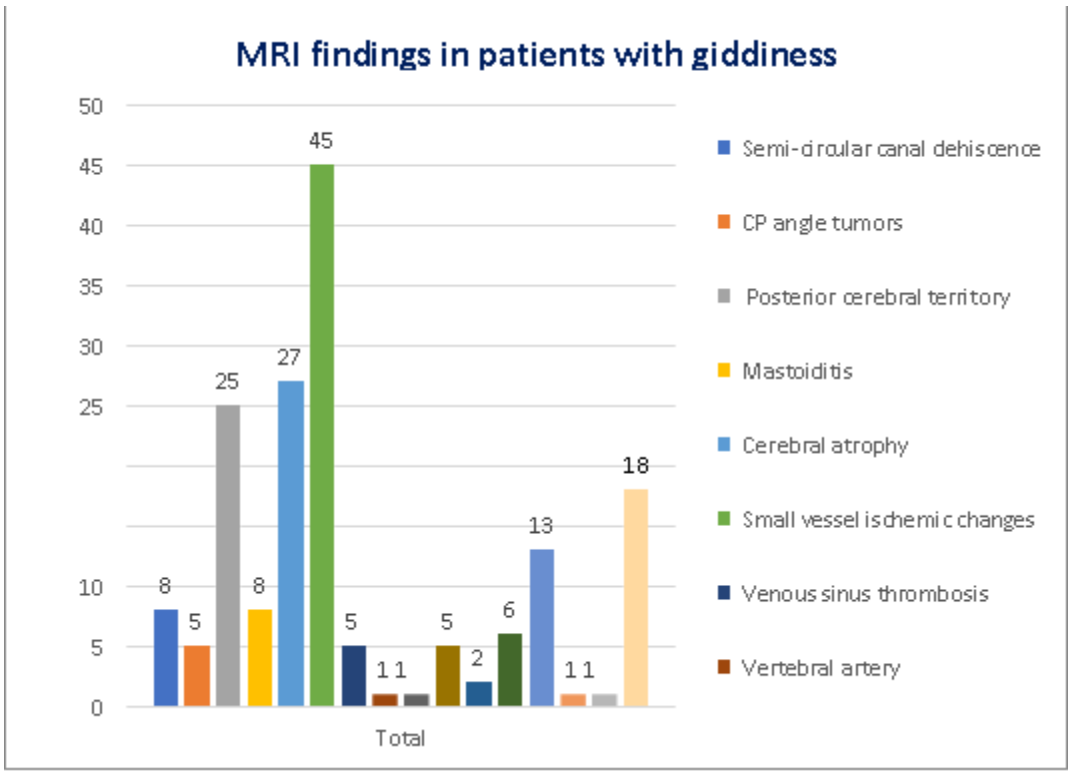


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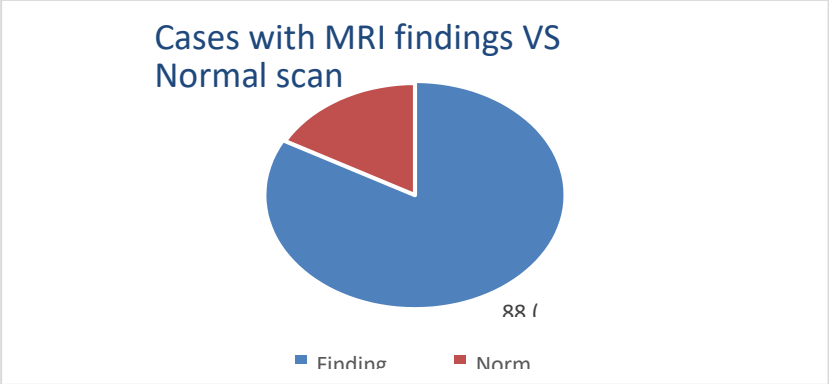
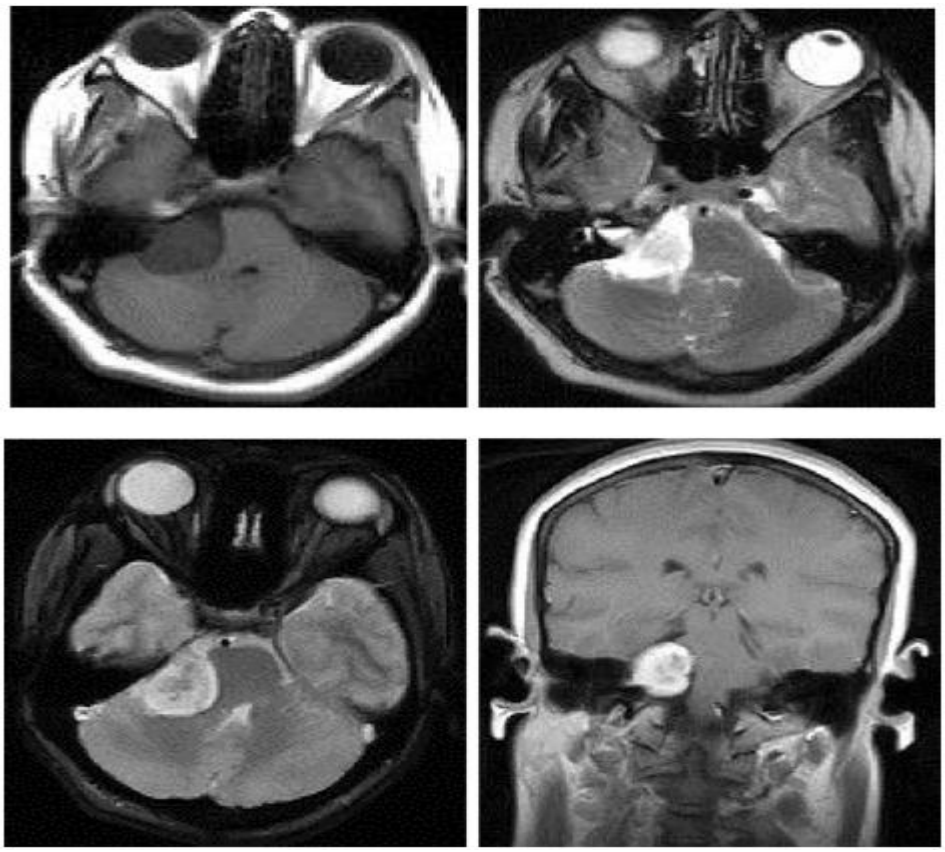
Figure 5: Number of patients with significant MRI findings VS Normal Scan



Among the study group, 83 % (88) of the cases had significant MRI findings that are known to cause giddiness and17% (18) of the cases had normal MRIscan.

Out of 18 normal scans, 11 patients were clinically diagnosed as BPPV, cause of giddiness in 3 patients was psychological,2 patients had orthostatic hypotension and after taking detailed history 2 patients were diagnosed with drug inducedvertigo.

Figure 6: ACOUSTIC SCHWANNOMA



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MRI brain T1W and T2W image axial section shows a well- defined, extra -axial, T1 hypointense and T2 heterogeneous lesion in right cerebello -pontine angle with extension into the internal auditory canal showing few dark areas on GRE (likely hemorrhagic foci). T1W post contrast image axial and coronal section showing avid enhancement of the lesion.

3. DISCUSSION

Giddiness is acommon symptom whichaffectsabout30% of people over the age of 65. [31-32]Benign paroxysmal positional vertigo,acute vestibular neuronitis, and Meniere's disease cause most cas es of giddiness; however, physicians must consider other causes including cerebrovascular disease, semicircular canal dehiscence, migraine, psychological disease, perilymphatic fistulas, multiple sclerosis, and intracranial neoplasms . In these patients MRI scanis done to look for the cerebrum, cerebellum as well as for cerebello - pontine angle lesions and the internal auditorymeatus.

A descriptive cohort study was conducted on patients who present with complaint of giddiness(vertigo, light headedness, presyncope, and disequilibrium). In the present study 106 patients who presented with giddiness underwent MRI brain. MRI showed high sensitivity to visualize findings that were clinically significant and consistent with giddiness. We found that approximately 83% of scans had positive findings and 17% scans were normal. Kalsotra et al studied the findings on magnetic resonance imaging in patients with giddiness by evaluating MRI scans of 62 patients and reported 54.84% MRI scans as normal [33].

In the present study, most common finding was smallvesselischemic changes in 26.3% of the scans. In 2010 Papanikolaou et al. studied findings on MRI scans of patients presenting withaudiovestibular symptoms. Subcortical white matter hyperintensive foci has been reported in 44% cases by Papanikolaou et al [34] .

In present study the second most common finding was cerebral atrophy in 15.7%. Kerber et al. have pointed to the possible association of cerebral atrophy and giddiness [15] . Papanikolaou et al reported atrophy in 5. 5% cases[34] while Kalsotra et al reported it in 3.22%[33].Another significant and prevalent

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findingwasposterior cerebral territory infarct in 14.6% scans and non-posterior cerebral territory infarct in 7.6% scans. Zoya Irfan Khan et al conducted retrospective study and analyzed MRI brain scans of 500 patients who presented with giddiness and reported acute infarcts in 8.4% cases[35].

In the present study semicircular dehiscence was seen in 8(4.6%) scans which significantly attributes to giddiness.P. Browaeys et al. found that MR imaging has a sensitivity of 100% to depict semicircular canal dehiscence.

Mastoiditis was seen in 4.6% scans compared to 3% cases reported by Papanikolaou et al in his study.In the present study CP angle tumors were visualized onMRI in 5(2.9%)scans.Other findings include intracranial hemorrhage in 6(3.5%) scans, SOL in 5(2.9%) scans, venous sinus thrombosis in 5(2.9%) scans, benign intracranial hypertension in 2(1.1%) scans, meningoencephalitis in 1 scan (0.58%), hypoxic ischemic encephalopathy in 1 scan (0.58%), vertebral arterystenosis/occlusion in 1 scan (0.58%), and vertebrobasilar dolichoectasia compressing over the midbrain in 1 scan(0.58%).

In the present study 45% were males and 55%were females out of which significant MRI findings were found in 50 males and 38 females.Study conducted by Zoya Irfan Khan et al included 57.6% females and 42.4% males with age ranging between 36 to 74 years were found[35].Current study comprised of patients between 6 -94 years of age with mean age of 49.2 years. Majority of the cases i.e. 65% were in the age group of 21 -60years.

White matter hyperintensities and its progression, present in the MRI's of older people have been associated with hypertension and evidence suggests that WMHs occur because of arteriosclerosis within the wall of the arteriole. [36,37]Large arterial and small vessel disease of the cerebral circulation share risk factors, (e.g., hypertension, diabetes) and may coexist in individuals. People with uncontrolled and untreated hypertension had significantlygreaterwhite matter lesion progression than people with uncontrolled but treated hypertension.

In the present study 40 (37.7%) patients were knownhypertensive. Out of 45 scans with

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small vessel ischemic changes (white matter hyperintensities) on MRI, 27 patients werehypertensive i.e. 60% of the cases with WMH were hypertensive.Out of 25 scans with PCA territory infarct on MRI, 15 patients were hypertensive i.e. 60% of the cases with PCA territory infarct werehypertensive. Out of 13 scans with non-PCA territory infarct on MRI, 10 patients were hypertensive i.e. ~ 77 % of the non-PCA territory infarct cases were hypertensive.

CONCLUSION

MRI has high sensitivity and can successfully demonstrate the significant findings which presents as giddiness. Out of 106 cases, 83% (88) of the cases had significant MRI findings that are known tocausegiddinessand17%(18)ofthecaseshadnormalMRIscan.Most common finding was small vessel i schemic changes and cerebral atrophy in these patients. PCA and non-PCA territory infarcts were among the other predominantfindings.

Spectrum of other findings included semicircular canal dehiscence, mastoiditis, CP angle tumours, intracranial hemorrhage, SOL, venous sinus thrombosis, benign intracranial hypertension, meningoencephalitis, hypoxic ischemic encephalopathy, vertebral artery stenosis / occlusion and vertebrobasilar dolichoectasia compressing over themidbrain.

Male predominance was noted in the study group.Majority of the cases ie., 33 % belong to the age group 41 -60 years, 32 % belong to the age group 21 - 40 years with the mean age of 49.2years.MRI is a costly investigation, so it should be used judiciouslyin such patients after obtaining detailed history andphysicalexamination who do not respond to routine medications.

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Ethical approval: The study was approved by theInstitutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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