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Original Article

Underlying causes of vertigo or dizziness among patients presenting to Ear, Nose and Throat clinic at a tertiary care hospital in North Central province - Sri Lanka

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Abstract

Introduction: Disturbance to the function of vestibular apparatus or sensory processing of its signals presents as vertigo or dizziness. Vertigo/dizziness are common symptoms that can cause significant morbidity to patients. There is no data on underlying causes for dizziness and vertigo available in Sri Lanka.

Objective: To determine the underlying causes of vertigo/dizziness in a cohort of Sri Lankan population.

Method: A cross sectional descriptive study was conducted among patients presenting with vertigo/dizziness to ENT clinic at teaching hospital Anuradhapura from March 2016 to February 2017. All patients were assessed and diagnosed according to a common protocol and accepted standard guidelines.

Results: Out of 627 patients, 290(46.3%) were males. Mean age of presentation was 51.1 years (SD 15.8). Benign paroxysmal positional vertigo (BPPV) was the commonest diagnosis (n229, 36.5%) followed by vestibular migraine (n161, 25.7%) andMénière disease (n50, 8.0%). BPPV was significantly higher among males (Chi-square 4.3, p .039) and vestibular migraine was significantly higher among females (Chi square 8.254, p .004). Acute vestibular neuronitis, acute labyrinthine failure, chronic vestibular failure and functional dizziness were diagnosed in 4.6%, 4.1%, 2.4% and 3% respectively.

Conclusion: The major underlying cause of dizziness/vertigo reported in this rural Sri Lankan population are similar to the data reported in other countries.

Keywords: Vertigo, Dizziness, BPPV, Anuradhapura, Sri Lanka

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Introduction

Disturbance to the function of vestibular apparatus or sensory processing of its signals presents as vertigo or dizziness. Dizziness in general, is defined as impairment in spatial perception and stability. Vertigo is specially characterized by sensation of whirling motion either of oneself or of external objects.

According to United States National Health and Nutrition Examination Survey (NHANES), where balance function was assessed using the modified Romberg test, 35% of US adults of age 40 years and older had evidence of balance dysfunction[1]. A study done in Germany has revealed lifetime adult prevalence of vestibular vertigo of 7.4%[2]. Many scientific studies have shown vestibular disorders to have significant impact on activities of daily living, social functioning, mood and cognitive status of individuals and increase risk of clinically significant outcomes such as fall [3,4,5].

The most frequently identified cause of vertigo is benign paroxysmal positional vertigo (BPPV), which accounts for up to one-third of vertigo presentations to dizziness clinics[6]. Other common causes include vestibular migraine, Meniere's disease, vestibular failure, psychiatric disorders and cerebrovascular disorders related to the vertebro-basilar circulation[7]. Rare causes are otholith dysfunction, vestibular paroxysmia, superior semicircular canal dehiscence syndrome, multiple sclerosis, and tumors of the posterior fossa (vestibular schwannoma)[1].

Although vertigo/dizziness, is one of the commonest presentations to ENT clinics, the leading underlying causes of this symptom have not been systematically assessed in Sri Lankan setting. This study was aimed to assess the underlying causes of vertigo/dizziness among patients presenting with vertigo or dizziness to the Ear, Nose and Throat (ENT) clinic at the teaching hospital, Anuradhapura.

Materials and methods

A cross sectional descriptive study was conducted among patients presenting with vertigo, and dizziness to ENT clinic at Teaching Hospital Anuradhapura (THA) from 1st of March 2016 to 28th February 2017. The study sample included consecutive patients of all ages, presenting to the ENT clinic with a history of vertigo and dizziness. At the first contact, study objectives were explained, and informed verbal consent was obtained from all patients before recruiting to the study. For the purpose of this study we developed an initial assessment form to evaluate these patients. A medical officer specially trained in assessing vertigo patients did initial assessment and physical examination. Video Frenzels were used routinely in examining nystagmus. Audiometry and other vestibular function tests (Video nystagmography, caloric test, electrocochleography and vestibular evoked myogenic potentials) were done when they are required to confirm a clinical diagnosis. Data extraction sheets were used to collect data from investigation reports. All clinic patients were followed up until a final diagnosis was arrived. All the patients were seen by a consultant Otolaryngologist to arrive at a final diagnosis.Diagnoses were made according to the

accepted standard guidelines at the time of study (table 1). Ethical clearance for the study was obtained from the ethics review committee of Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka.

Table1. The diagnostic criteria used in the assessment of common underlying causes of vertigo in Anuradhapura, Sri Lanka

Vestibular disorder	Diagnostic criteria
BPPV	Classical history of positional vertigo lasting less than one minute Characteristic nystagmus provoked by positional tests Dix-Hallpike test for Posterior and Superior canal (Mixed rotatory nystagmus with a secondary upbeat/downbeat that appears with a latency of few seconds, with crescendo and decrescendo phenomenon, adaptation, fatigability and reversal of nystagmus when patient returns to upright position) Supine roll test for lateral canal The side of the pathology was diagnosed by comparing the intensity and the direction of the nystagmus
Vestibular migraine	According to the Barany Society and the International Headache Society diagnostic criteria. At least five episodes with vestibular symptoms of moderate or severe intensity, each lasting 5 min to 72 h Current or previous history of migraine with or without aura according to the international Classification of Headache Disorders (ICHD) One or more migraine features with at least 50% of the vestibular episodes (Headache with at least two of the following characteristics: one-sided location, pulsating quality, moderate or severe pain intensity, or aggravation by routine physical activity, photophobia and phonophobia or visual aura). Not better accounted for by another vestibular or ICHD diagnosis Response to anti-migraine treatment was also taken into consideration in confirming the diagnosis of vestibular migraine.
Ménière's disease	According to the 2015 version of guidelines issued by the equilibrium committee of the American Association of Otolaryngology and Head and Neck Surgery (AAO-HNS). <u>Definite Ménière's</u> Two or more spontaneous episodes of vertigo, each lasting 20 min to 12 h Audiometrically documented low-to mid-frequency sensorineural hearing loss in one ear, defining the affected ear on at least one occasion before, during, or after one of the episodes of vertigo Fluctuating aural symptoms (hearing loss, tinnitus, or fullness) in the affected ear Not better accounted for by another vestibular diagnosis

	Probable Ménière's Two or more episodes of vertigo or dizziness, each lasting 20 min to 24 h Fluctuating aural symptoms (hearing, tinnitus, or fullness) in the affected ear Not better accounted for by another vestibular diagnosis
Acute unilateral peripheral vestibulopathy (Vestibular neuritis	An acute onset of spinning vertigo, postural imbalance and nausea that improves over days to week Horizontal rotatory peripheral nystagmus beating towards the non-affected side Pathological head-impulse test No evidence of central vestibular or ocular motor dysfunction (No ocular skew deviation and direction changing nystagmus) In unclear cases where all the above clinical findings were not met and in late presentations unilateral defective vestibulo-ocular reflex was demonstrated at the laboratory by caloric weakness on the affected side (A difference of sum of slow phase velocity (SPV) greater than or equal to 25% was taken as significant for a clinically significant unilateral weakness in the ear producing the lesser responses)
Labyrinthitis /Acute labyrinthine failure	An acute onset of spinning vertigo, postural imbalance and nausea that improves over days to week Horizontal rotatory peripheral nystagmus beating towards the non-affected side Pathological head-impulse test No evidence of central vestibular or ocular motor dysfunction (No occular skew deviation and direction changing nystagmus) - If there were any central signs, urgent imaging was done. Acute onset sensory neuronal hearing loss confirmed with audiometry
Bilateral vestibulopathy/Bilateral vestibular hypofunction	According to diagnostic criteria proposed by Kim S et al Symptoms only during locomotion - Unsteadiness and/or Oscillopsia Bilaterally positive head impulse test and/or Impaired dynamic visual acuity test Bilaterally reduced caloric responses (sum SPV $<25^0$/s) and/or Reduced gain on rotatory chair Not better accounted for by another vestibular diagnosis When imbalance was a prominent symptom (especially without associated vertigo), brain imaging was carried out to exclude a central cause.
Poorly compensated unilateral vestibular failure	Chronic dizziness, head motion induced dizziness or motion intolerance Positive head impulse test on affected side. Unilateral weakness in the caloric response equal or greater than 25% towards the affected side When symptoms were associated with other neurological features neuroimaging was carried out to exclude a central cause.

Benign paroxysmal vertigo of childhood (BPVC)	Sudden onset of brief episodes of vertigo or dizziness that did not account for the diagnosis of any other vestibular disorder Normal vestibular examination including positional tests Presence of migraine type headache together with response to anti migraine treatment was also taken into consideration in making the diagnosis.
Otolith dysfunction.	False sensations of liner motion or tilt. Abnormal vestibular evoked myogenic potential (VEMP) – Low intensity signals Not better accounted for by another vestibular diagnosis
Functional dizziness	Diagnosis of functional dizziness was suspected when following features were present. Postural vertigo with subjective instability of gait and posture in the presence of normal neurological results/ normal results in additional diagnostics Fluctuating instability of posture and gait with (attack-like) fear of falling without falls Trigger/exacerbation of the attacks in typical situations: crowds of people, empty rooms, department stores Improvement with light alcohol consumption and sports: less symptoms in the early morning Increasing avoidance behaviour Personality traits: usually compulsive or reacts with depression At the beginning of the illness often a vestibular disorder (25%) (e.g., vestibular neuritis) or a trigger situation
Vestibular Paroxysmia	5-10 attacks of spontaneous spinning or non-spinning vertigo lasting less than 1 min Stereotyped phenomenon in a particular patient Response to anti-neuralgic medications like carbamazepine/ oxcarbamazepine. Not better accounted for by another diagnosis
Third window syndrome/Superior Semicircular Canal Dehiscence (SSCD)	Vertigo or oscillopsia induced by loud noises or with increased intra cranial pressure (coughing, sneezing), autophony, hyperacusis. Decreased bone conduction thresholds in audiometry High amplitudes in cervical and ocular VEMPs Anatomical defect of the superior semicircular canal in high-resolution computed tomography (HRCT) of temporal bone.

Results and analysis

The study sample consisted of 627 patients presented with vertigo and dizziness and 290 (46.3%) of them were males. Mean age of study sample was 51.1 years (SD 15.8). The sample included two children less than 12 and another five teenagers aging less than 20 years.

The most common underlying cause for vertigo or dizziness in these 627 patients was BPPV (n=187, 29.8%), closely followed by vestibular migraine (n=161, 25.7%) andMénière disease (n=50, 8.0%). (Table 2).

Table 2. Common underlying causes of vertigo and dizziness among patients presented to ENT clinic, Anuradhapura

Diagnosis	N	%
BPPV	187	29.8
Vestibular migraine	161	25.7
Inconclusive/Lost to follow up	92	14.7
Ménière's disease	50	8.0
Acute U/L vestibular failure	29	4.6
Acute labyrinthine failure	26	4.1
Psychological	19	3.0
Benign paroxysmal vertigo of childhood	16	2.6
Poorly compensated U/L vestibular failure	11	1.8
Inconclusive 1st episode	9	1.4
Central causes (other than VM)	7	1.1
Medical causes	7	1.1
Otolith dysfunction	7	1.1
B/L vestibular failure	3	0.5
Vestibular paroxysmia	2	0.3
Superior semicircular canal dehiscence	1	0.2

There were 17 children (6 males, 11 female) less than 12 years in the study sample. Two of them had classical features of vestibular migraine according to the Barany society and International headache society guidelines. Rest of the 15 patients had brief attacks of vertigo lasting few seconds to 2-3 minutes and they were diagnosed as having benign paroxysmal vertigo of childhood (BPVC)[9].

Table 3 shows the distribution of commonest causes of vertigo and dizziness by age and sex. Among males, significantly higher number of BPPV (98, 43.3%) was diagnosed compared to females (89, 34.2%) (Chi-square 4.3, p .039). On the other hand, vestibular migraine was more common among females (101, 38.9%) compared to males (60, 26.6%) and this observed difference was significant (Chi square 8.254, p .004).

Table 3. Distribution of common causes for vertigo by age and sex

	BPPV		Vestibular migraine		Ménière's disease		Acute U/L vestibular failure		Acute labyrinthine failure		Chronic vestibular failure		Functional dizziness	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Age (years)														
<12	0	0	2	1.2	0	0	0	0	0	0	0	0	0	0
12-19	1	0.5	3	1.9	0	0	0	0	0	0	0	0	1	5.3
20-39	38	20.3	37	23.0	3	6.0	4	13.8	6	23.1	3	21.4	11	57.9
40-59	92	49.2	75	46.6	36	72.0	16	55.2	10	38.5	3	21.4	4	21.1
>59	56	29.9	44	27.3	11	22.0	9	31.0	10	38.5	8	57.1	3	15.8
Sex														
Male	98	52.4	60	37.3	22	44	14	48.3	16	61.5	9	64.3	7	36.8
Female	89	47.6	101	62.7	28	56	15	51.7	10	38.5	5	35.7	12	63.2

In the process of diagnosis of BPPV, 141 (75.4%) showed characteristic nystagmus at positional tests. Forty-six (24.6%) of them only perceived vertigo at Dix-Hallpike test but did not show characteristic nystagmus and labelled as having positional test negative BPPV. All 46 patients had negative supine roll test, did not have any symptom or sign to suggest a central pathology and showed symptomatic improvement following the Epley's canalith-repositioning manoeuvre. The 8 patients with lateral canal BPPV and the 2 patients with superior canal BPPV had characteristic nystagmus and perceived vertigo during relevant positional tests. All 10 had symptomatic improvement following relevant canalith-repositioning manoeuvres.

Six patients with BPPV and 2 patients with Ménière disease had features of vestibular migraine together with their primary presentation. Of the 50 patients diagnosed as having Ménière disease, 24 (48.0%) had definite Ménière disease and 26 (52.0%) had probable Ménière disease. Four of these patients had chronic dizziness, imbalance and characteristic episodic vertigo more than 5 years with more than 25% of caloric weakness on the affected side. Burnt out Ménière diseasewas diagnosed in those patients.

Altogether 55 patients (8.8%) presented with acute vestibular failure either due to acute vestibular neuritis or due to acute labyrinthine failure. Acute unilateral peripheral vestibulopathy[10,11] or vestibular neuritis was diagnosed in 29 patients. Out of 26 patients with acute labyrinthine failure only one had a history of chronic suppurative otitis media. In all the other patient's symptoms had appeared insidiously or few days following a febrile illness suggesting a viral aetiology.

Of the 18 chronic vestibular failure patients, 15 had chronic unilateral vestibular failure. Nineteen patients (3%) who presented with nonspecific chronic dizziness or instability did not fit in to any of the specific diagnostic criteria for vestibular disorder but had clinical features suggesting a psychological cause. One of them was diagnosed as having somatoform disorder and diagnosis of functional dizziness was made in other eighteen according to criteria put up by Brandt et.al.[12]. In another 9 patients with vestibular migraine and one patient with U/L vestibular failure, functional vertigo was thought to be contributory to the vestibular symptoms evoked by their primary diagnosis.

Diagnosis was inconclusive in total of 101 patients. Lost to follow up for further evaluation or for vestibular investigations was the main reason for this deficiency. In few patients there were difficulties in taking a detailed clinical history due to intellectual disability. Although a fair diagnosis could be made in 54 of them on clinical grounds, they could not be included into any of the vestibular disorders described above, as their clinical findings did not completely full fill the diagnostic criteria used in our study.

Discussion

In keeping with previously published literature, we have observed that the commonest underlying cause for vertigo in Sri Lankan settings was BPPV, which is the commonest cause of vertigo accounting for approximating 20-30% of diagnoses in specialized dizziness clinics[6]. However, we observed that, among females, the leading underlying cause of vertigo and dizziness as vestibular migraine.

Although Dix-Hallpike test and other positional tests are described as gold standard tests in diagnosing BPPV[12], we observed that 46 patients (24.6 %) with suspected posterior canal BPPV only perceived vertigo but did not show characteristic nystagmus during Dix Hall-pike test. Prevalence of positional test negative BPPV ranges from 20-26% according to previous studies[13,14]and that is in keeping with our data.

Previous studies show that ‘definite’ vestibular migraine represents about 10% of patients presenting to specialized dizziness clinics [9, 19] a lower percentage compared to our observation of 25.7%. Although we used ICHD3beta diagnostic criteria[15] in diagnosing vestibular migraine, we also considered ‘probable migraine’ as per previous guidelines[16]. Accordingly, response to anti-migraine treatment was also taken into account, as there is a subset of episodic vertigo patients who respond to standard anti-migraine treatment in day-to-day clinical practice. Patients with spontaneously occurring short-lasting vertigo episodes who do not fall into vestibular migraine diagnostic criteria were given a trial of carbamazepine to confirm the diagnosis of vestibular paroxysms [17].

Ménière disease was the 3rd most common aetiology in our study group. This is also comparable with previously reported prevalence of Ménière disease in specialized balance clinics[18]. We used 2015 version of the guidelines issued by the equilibrium committee of the American Association of Otolaryngology and Head and Neck Surgery (AAO-HNS)[16] in diagnosing Ménière disease. Further, electrocohleographywas found to be extremely useful in

confirming probable Ménière disease, especially when it is co-existent with vestibular migraine. Therefore, we believe that electrocohleography has a potential of re-defining Ménière disease diagnostic criteria in the future.
In 11 patients, poor compensation of acute unilateral vestibular failure was diagnosed as the cause for chronic dizziness usingcaloric test[19]. This highlights the usefulness of the caloric test, especially when the clinical findings are negative. We also found that vestibular evoked myogenic potentials were quite useful in diagnosing rare conditions like superior semicircular canal dehiscence syndrome (SSCD)[20]and otolith imbalance[21]. We used high resolution CT scan to confirm the diagnosis of SSCD.

A psychological cause as the aetiology for vertigo/dizziness was found only in 19 patients (3%) in our study group. We could not positively diagnose many patients as having functional vertigo at first visit, though we used diagnostic criteria published by Brandt et.al[i]in an attempt to diagnose this condition. There were no universally accepted diagnostic criteria for psychological vertigo at the time of the study. Diagnostic criteria for postural-perceptual dizziness by Barany society were only published recently in August 2017[23].

According to present guidelines, diagnosis of most of the vestibular disorders solely depends on clinical history and examination. Although the diagnosis can be confidently made with history and examination alone in a majority of patients, it can be challenging in situations where patients do not have characteristic features described in textbooks or guidelines. In patients with chronic dizziness this can be really challenging. In these instances, vestibular investigations (Caloric test, electrocochleography, vestibular evoked myogenic potentials and video nystagmography) can be effective aids in confirming the diagnosis. But evidence for uses of these tests is either lacking or when available is not strong enough to use as diagnostic tools. Therefore, we recommend further research on this field to improve the diagnostic accuracy of vestibular disorders in the future.

Conclusions

Benign paroxysmal positional vertigo is the commonest diagnosis followed by vestibular migraine andMénière disease amongst Sri Lankans presenting with vertigo. Our data is comparable to prevalence data from other countries. Inconsistency on the psychological vertigo could have possibly been due to unavailability of globally accepted criteria for a definite diagnosis at the time of the study. Although the diagnosis can be made with clinical features alone in a majority of patients, it can be challenging in situations when patients have atypical presentations. Vestibular function tests can be useful when the clinical features are inconclusive. Further studies are required to determine sensitivity and specificity of these tests in different clinical conditions.

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