

Original Research Article

Epidemiological and Clinical Study of Vertigo in a Tertiary Care Hospital of Bangladesh

Abstract

Aims: Vertigo is an abnormal perception of the movement of the environment or self and may result from diseases of the labyrinth, vestibular nerve or its central connections, vertebrobasilar insufficiency, and anxiety disorder. In this study, we aimed to evaluate the epidemiological and clinical characteristics of vertigo patients.

Study design: Descriptive cross-sectional study.

Methodology: This cross-sectional study was done at the Neurology outpatient department (OPD) of Bangabandhu Sheikh Mujib Medical University (BSMMU) from September 2013 to August 2015. All the patients presenting with vertigo were evaluated by history, clinical examinations, Dix-Hallpike test, and appropriate investigations.

Results: Total patients were 164 (male 57.3%) with a mean age of 44.45 ± 14.46 years. Half of them were in the 36-56 years age group. 58.5% of patients came from urban areas and 41.5% from rural areas. Nearly two-fifths (37.2%) suffered from benign paroxysmal positional vertigo (BPPV), 20.7% had anxiety disorder, 14.6% Meniere's disease, 11% migraine, and 6.1% had a transient ischaemic attack (TIA). Two-fifths had precipitating factors. Vertigo was associated with restlessness and palpitation (18.29%), headache (15.85%), vomiting (14.02%), insomnia (12.19%), tinnitus (10.98%), diplopia (6.09%), slurred speech (5.1%), and deafness (4.9%). Common comorbidities were hypertension (HTN) (15.2%), diabetes mellitus (DM) (5.5%) and ischemic heart disease (IHD) (0.6%). Hallpike test was positive in 37.8% of patients; among them, 87.1% were improved by the Epley's maneuver.

Conclusion: Our present epidemiological study suggests that vertigo is a symptom for which there are several causative factors. BPPV was the commonest cause in our patients. Vertigo patients often have associated symptoms and other comorbidities.

1. Introduction:

Vertigo is an abnormal perception of a movement of the environment or self; and occurs because of conflicting visual, proprioceptive, and vestibular information about a person's position in space¹. It is a subjective symptom, a sense of whirling of the environment or the body, and a motor illusion². Vertigo may result from the pathology of the labyrinth, vestibular nerve or their central connections, vertebrobasilar insufficiency & anxiety disorder³. About 1.8% of young adults and more than 30% of elderly people suffer from vertigo^{4,5}. The incidence of vertigo increases with age, 13-38% of the referrals of patients over 65 years old are due to vertigo⁶⁻⁹. Usually, vertigo does not increase the risk of mortality but it can affect the patient's quality of life¹⁰. Even though dizziness and vertigo are common causes of patients' visits to the hospital, there is very little clinical-based epidemiological information available on this condition. Vertigo is one of the common symptoms of different neurological disorders, with high incidence and complicated causes having numerous differential diagnoses¹¹. Vertigo may be caused by both central and peripheral vestibular dysfunction. Central causes are vertebrobasilar ischemia/infarction, posterior fossa mass lesion/ demyelination, migraine, and disorders of the craniovertebral junction. Peripheral vestibular disorders are vestibular neuritis, benign paroxysmal positional vertigo (BPPV), Meniere's disease, trauma, perilymph fistula, and drugs. Anxiety is the most common cause of

dizziness in those under 65 years¹². Thus a clear understanding of these vestibular disorders is necessary for the evaluation and management of vertigo. The present study surveyed 164 vertigo patients retrospectively, and analyzed their clinical characteristics and causes, to help clinical diagnosis and management of vertigo.

2. Materials and Methods:

2.1 Study population

After approval from the Institutional Review Board, relevant clinical data of 164 patients in the Neurology outpatient department of Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka between 2nd September 2013 and 27th August 2015 were collected. Patients were selected by purposive sampling. Informed written consent was taken from all patients. Patients' age ranged from 15 to 84 years and 94 of them were male while 70 were female. All the patients presented with vertigo as the chief complaint.

2.2 Methods

All the patients presenting with vertigo were evaluated by proper history including age, sex, duration and frequency of episode, precipitating factors, relationship to the head and body position, course and associated symptoms including tinnitus and deafness, past medical history, general, neurological, other systematic examinations and Dix-Hallpike test. Brain imaging (CT or MRI) and Pure Tone Audiometry (PTA) were done in selective cases. Epley's maneuver was done in appropriate cases.

2.3 Statistics

The causes and clinical features of vertigo were summarized. All variables were analyzed descriptively. Statistical significance was not determined in this study.

3. Results:

Table 1: Distribution of patients by age

Age group(year)	No. of patients	Percentage
15-25	18	11
26-35	31	18.9
36-45	41	25
46-55	41	25
56-65	18	11
>65	15	9.1
Mean(SD)	44.45±14.46	
Range	15-84	

Analysis of age distribution of the vertigo patients (table 1) revealed that the incidence of vertigo increases with age, and maximum between 36-55 years of age. Most of the vertigo patients who suffered from BPPV are from 26–55 years old.

Table 2: Distribution of patients by sex

Sex	No. of patients	Percentage
Male	94	57.3
Female	70	42.7

Among the total 164 patients, 57.3% (94 patients) were male and 42.7% (70 patients) were female. So the occurrence of vertigo was more common in the male sex as shown in this study (table 2).

Table 3: Distribution of patients by residence

Residence	No. of patients	Percentage
Urban	96	58.5
Rural	68	41.5

Analysis of the distribution of patients by residence revealed that 58.5% of patients came from urban areas and 41.5% from rural areas.

Table 4: Distribution of patients by occupation

Occupation	No. of patients	Percentage
Student	9	5.5
Housewife	57	34.8
Service holder	35	21.3
Businessman	23	14
Retired	6	3.7
Others	34	20.7

In this study, most of the patients were housewives (34.8%) and other patients were service holders (21.3%), businessmen (14%), and students (5.5 %).

Table 5: The causative factors of vertigo and their contribution

Causes	No. of patients	Percentage
BPPV	61	37.2
Anxiety disorder	34	20.7
Meniere's disease	24	14.6
Migraine	18	11.0
Transient ischemic attack	10	6.1
Tension-type headache	7	4.3
Labyrinthitis	4	2.5
Epilepsy	3	1.8
Motion sickness	3	1.8
Total	164	100

The causes and their contribution to vertigo in the patient population analyzed are shown in Table 5. By far, BPPV and anxiety disorder appear to contribute maximally to vertigo in our study population. Nearly 37.2% of the patients had BPPV and 20.7% had an anxiety disorder, 14.6% of the vertigo patients suffered from Meniere's disease, and migraine affected almost 11% of the patients.

Table 6: Distribution of patients by duration

Duration	No. of patients	Percentage
<6 months	94	57.3
6 months-1 year	33	20.1
>1 year	37	22.6

Our study on the duration of vertigo revealed that 57.3% of patients had less than 6 months, 22.6% more than 1 year, and 20.1% had 6 months to 1-year duration.

Table 7: Distribution of patients by precipitating factor

Precipitating factor	No. of patients	Percentage
Present	66	40.2
Absent	98	59.8

Precipitating factors (like posture change, and anxiety) were present among 40.2% of patients.

Table 8: Distribution of patients by associated symptoms

Associated symptoms	No. of patients	Percentage
Restlessness and palpitation	30	18.29
Headache	25	15.85
Vomiting	23	14.02
Insomnia	20	12.19
Tinnitus	18	10.98
Blurring of vision, diplopia	10	6.09
Slurred speech	9	5.1
Deafness	8	4.9
No symptoms	48	50

Along with vertigo, there were associated symptoms like restlessness and palpitation (18.29%), headache (15.85%), vomiting (14.2%), insomnia (12.19%), tinnitus (10.98%), blurring of vision/diplopia (6.09%), slurred speech (5.1%) and deafness (4.9%).

Table 9: Distribution of patients by comorbidity

Comorbidity	No. of patients	Percentage
DM	9	5.5
HTN	25	15.2
HTN+DM	19	11.6
IHD	1	0.6
Others	5	3

No comorbidity	105	64
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Among vertigo patients, 15.2% had hypertension, 11.6% both hypertension & diabetes & 5.5% only diabetes.

Table 10: Distribution of patients by personal history

Personal history	No. of patients	Percentage
Smoking	23	14
Betel nut	10	6.1
OCP	1	0.6
Others	1	0.6
No contribution	129	78.7

14% of patients were smokers, 6.1 % betel nut chewers, and 0.6 % of patients took an oral contraceptive pill.

Table 11: Distribution of patients by family history

Family history	No. of patients	Percentage
Present	7	4.3
Absent	157	95.7

4.3 % of sufferers had a positive family history of vertigo.

Table 12: Distribution of patients by Hallpike test

Hallpike	No. of patients	Percentage
Positive	62	37.8
Negative	102	62.2

Hallpike test was positive in about 37.8% of total patients.

Table 13: Distribution of patients by post-Epley's maneuver improvement

Post Epley improvement	No. of patients	Percentage
Improved	54	87.1
Not improved	8	12.9

Those who were Hallpike positive about 87.1% were improved by the Epley's maneuver.

Table 14: Distribution of patients by deafness type

Deafness type	No. of patients	Percentage
Conductive	68	70.1
Sensory	12	12.4
Mixed	17	17.5

Among the total patients, 97 patients had deafness. Conductive deafness was present in 70.1% of patients, 12.4% had sensory neural deafness & 17% mixed type of deafness.

Table 15: Distribution of patients by Pure Tone Audiometry (PTA) report

PTA report	No. of patients	Percentage
Normal	50	34
Mild deafness	79	53.7
Moderate deafness	11	7.48
severe deafness	7	4.76

Deafness severity was assessed by PTA, most of the patients had mild deafness (53.7%).

4. Discussion:

It has been reported earlier that migraine is strongly associated with the incidence of vertigo¹³⁻¹⁵. In this study with the 164 patients visited in our hospital, the most common cause of vertigo was BPPV, followed by anxiety neurosis. Other important causes were Meniere's disease, migraine, cervical spondylosis, and labyrinthitis. In a study with Chinese patients, posterior circulation insufficiency was the causative factor in nearly 60% of the vertigo patients¹⁶. This difference may be attributed to the following reason - (1) patients in the current study were all outpatients, who were not admitted to the hospital, and most of the posterior circulation ischemic patients usually got admitted in the hospital because of the extent and duration of vertigo and (2) most of the patients in our study were young adults and middle-aged, and few of them had risk factors of stroke.

Benign paroxysmal positional vertigo is a disorder of labyrinthine function characterized by paroxysmal vertigo and nystagmus that occur only with the assumption of certain positions of the head, particularly lying down or rolling over in bed¹⁷. The fall of the calcium carbonate otolith from the macula of the utricle into one of the semicircular canals leads to BPPV. These otoliths, because of their higher density, move in response to gravity and cause ampullary nerve excitation in the affected canal, which in turn, triggers a burst of vertigo that is associated with nystagmus unique to the affected canal¹⁷. Vertigo of BPPV is latent, rotating, transient, and exhaustible. Surprisingly, none of the present studied patients was previously diagnosed with BPPV and this could be due to the lack of related history or Dix-Hallpike test. In this study, BPPV was more prevalent in young adults and middle-aged, about 77% of patients were between 26 -55 years of age. Among the total 61 patients with BPPV- 34 patients (55.7%) were male and 27 (44.3%) female. So BPPV was relatively more common in male patients. Vomiting was the most prevalent (19.7%) associated symptom of BPPV in this study. Hallpike test was positive in 86.9 % of BPPV patients and among them, 80.3% were improved by the Epley's maneuver.

Some authors state that anxiety is the most common cause of vertigo under 65 years of age¹. But in our study anxiety neurosis was the 2nd most common cause of vertigo next to BPPV (34%).

The 3rd common cause of vertigo in this study was Meniere's disease (14.6%). Meniere's disease is characterized by paroxysmal attacks of vertigo associated with fluctuating tinnitus and deafness. The main pathologic changes consist of an increase in the volume of endolymph and distension of the endolymphatic system (endolymphatic hydrops)¹⁸. In this study around 41.7% of patients with Meniere's disease had sensory neural deafness and 41.7% mixed type of deafness.

The next common cause of vertigo was migraine, about 11% in our study. Occurrence of migraine was more common between 15-45 years of age. Among them, female patients were more sufferers (66.7%).

Another important cause of vertigo is labyrinthitis, but in our study, only 2.4% had this condition. Probably labyrinthitis patients attended in Otolaryngology department more than neurology.

The posterior circulation is also called the vertebrobasilar artery system. It consists of the vertebral artery, the basilar artery, and the posterior cerebral artery, mainly supplying the brain stem, cerebellar, thalamus, occipital lobe, part of the temporal lobe, and the upper spinal cord. Posterior circulation insufficiency (PCI) includes post-circulation TIA, cerebellar infarction, and brain stem infarction. The most frequently seen symptoms of PCI are dizziness/vertigo, extremity/head, and facial numbness, extremity weakness, headache, nausea, vomiting, diplopia, transient loss of consciousness, visual disorder, and lack of balance while walking or falling. Signs are altered consciousness, oculomotor nerve palsy, extremity paralysis, paresthesia, walking/extremity ataxia, dysarthria/ dysphagia, and visual field defect¹⁹. In our study, only a few patients had posterior circulation TIA.

Age distribution analysis of the vertigo patients studied presently showed that a majority of the BPPV-affected patients fell in the age group of 26–55 years in comparison to the group of older patients. However, posterior circulation TIA afflicted vertigo patients were predominantly more than 45 years old. This suggests that age is

one of the factors that should be taken into consideration when diagnosing vertigo. In this sample of patients, only 9.1% were elderly people.

This study also had certain limitations. No caloric test was done to see the vestibular dysfunction. As only neurology OPD patients were taken as samples, observed data may differ from population-based data. So, further large-scale multi-centered and multidisciplinary studies must be conducted to know the actual demographic picture of vertigo patients.

5. Conclusion:

Vertigo is not a disease. It is the symptom of underlying otological and neuropsychological conditions. Most of the underlying causes are benign, like BPPV and anxiety disorders. But in a significant percentage, serious underlying causes like cerebrovascular disease, other brain stem lesions, and Meniere's disease can be found. Detailed history, meticulous clinical examination, and relevant investigations are needed to manage the underlying condition. Additional symptoms and comorbidities are also needed to be assessed for proper management.

CONSENT

Informed written consent was taken from each patient or from his/her attendant.

ETHICAL APPROVAL

Ethical approval was obtained from Institutional Review Board of BSMMU.

References

1. Langhorne, P. 'Davidson's Principles of Medicine; Stroke disease'. 22nd edition. New Delhi: Elsevier, 2014; pp. 1167.
2. Yan Zhang et al(2010). A Clinical Epidemiological study in 187 patients with vertigo; Cell Biochem Biophys(2011) volume59,pp109-12
3. Lindsay, K.W., Bone, I. and Callander, R. Neurology and Neurosurgery illustrated. 5thed. Edinburgh: Churchill-livingstone. 2010; PP. 173.
4. Sloane PD, Coeytaux RR, Beck RS, Dallara J. Dizziness: state of the science. Ann Intern Med. 2001;134(9_Part_2):823-32.
5. Reid SA, Rivett DA. Manual therapy treatment of cervicogenic dizziness: a systematic review. Man Ther. 2005;10(1):4-13.
6. Sloane P. Dizziness in primary care. Results from the national ambulatory medical care survey. J Fam Pract. 1989;29(1):33-8.
7. Nakashima K, Yokoyama Y, Shimoyama R, et al. Prevalence of neurological disorders in a Japanese town. Neuroepidemiology. 1996;15(4):208-13.

8. Moulin T, Sablot D, Vidry E, et al. Impact of emergency room neurologists on patient management and outcome. *Eur Neurol.* 2002;50(4):207-14.
9. Kroenke K, Spitzer RL, Hahn SR, et al. Multisomatoform disorder: an alternative to undifferentiated somatoform disorder for the somatizing patient in primary care. *Arch Gen Psychiatry.* 1997;54(4):352-8.
10. Sharami A, Norouzi M, Kariman H, Hatamabadi HR, ArhamiDolatabadi A. 2016, A true vertigo patients in emergency department; an epidemiologic study, vol 4(1):pp-25-28.
11. Yan Zhang et al (2010). A Clinical Epidemiological study in 187 patients with vertigo; *Cell Biochem Biophys*(2011) volume 59, pp 109-12
12. Langhorne, P. 'Davidson's Principles of Medicine; Stroke disease'. 22nd edition. New Delhi: Elsevier, 2014; pp. 1158.
13. Kerber, K. A. (2009). Vertigo and dizziness in the emergency department. *Emergency Medicine Clinics of North America*, 27, 39–50. VIII
14. Bhattacharyya, N., Baugh, R. F., Orvidas, L., Barrs, D., Bronston, L. J., Cass, S., et al. (2008). Clinical practice guideline: benign paroxysmal positional vertigo. *Otolaryngology—Head and Neck Surgery*, 139, S47–S81.
15. Lempert, T., & Neuhauser, H. (2009). Epidemiology of vertigo, migraine and vestibular migraine. *Journal of Neurology*, 256, 333–338.
16. Eggers, S. D. (2006). Migraine-related vertigo: diagnosis and treatment. *Current Neurology and Neuroscience Reports*, 6, 106–115.
17. Caplan, L. R., Wityk, R. J., Glass, T. A., Tapia, J., Pazdera, L., Chang, H. M., et al. (2004). New England medical center posterior circulation registry. *Annals of Neurology*, 56, 389–398.
18. Ropper, A.H., Samuels, M.A. and Klein, J.P. 'Adams and Victor's Principles of Neurology.' 10th edition. New York: McGraw Hill education press. 2014; pp. 307.
19. Neuhauser, H. K. (2007). Epidemiology of vertigo. *Current Opinion in Neurology*, 20, 40–46.

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