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Vertigo and Dizziness in Adolescence: A Renovate

Dr. Ashim Sarkar[1], Dr. Shrutinath Banerjee[2]

[1]MBBS, MS ENT, Assistant Professor Bardhaman Medical College & Hospital
[2]HOD & Consultant Audiologist of REHEAR SPEECH AND HEARING CLINIC

Abstract

Introduction: Dizziness in childhood is a complaint of a wide spectrum of diagnoses. This is common to misdiagnose the cause of dizziness in children, which eventually results in the delay of treatment. The aim of this study was to review the clinical characteristics and neurotological evaluation of vertigo in patients younger than 18 years and assist in making a differential diagnosis for children with vertigo and balance disorders. Differential diagnosis can assist to determine the correct management strategy to treat vertigo and imbalance in pediatric patients.

Methods: Children presenting with a chief complaint of vertigo or unsteadiness to REHEAR SPEEECH AND HEARING CLINIC, BURSWAN, were included for this study based on clinical history, physical examination, and neurotological evaluation.

Results: A total of 15 patients with a mean age of 11.67 years were evaluated. The most common cause associated with vertigo or dizziness was found to be vestibular migraine seen in 5 participants of this study. This was followed by unilateral peripheral vestibulopathy in 4 patients, bilateral peripheral vestibulopathy in 2 patients, and central vestibulopathy in 1 patient. Vertigo was also seen to be associated with various other disorders.

Conclusion: Vertigo in children should be taken seriously by the clinician and family. Pediatric vertigo can be due to many reasons. History and evaluation are the only way to diagnose the etiology and site of lesion. This will prevent misdiagnosis and delay in the treatment, which can ultimately lead to deterioration of the quality of life.

Keywords: pediatric vertigo, Vestibular disorders, children in vertigo, clinical characteristics

INTRODUCTION

Dizziness is an uncommon complaint in children and adolescents. Dizziness in childhood is a complaint of a wide spectrum of diagnoses. Vertigo in children tend, therefore, to present to a wide variety of different specialists and our current knowledge of its prevalence is based largely on reports from specialized clinics rather than on population surveys. The diagnosis of childhood or adolescent vertigo differs from that of adults. Several causes are unique to the pediatric population while the occurrences of other pathologies are rather different in children and adults. They are not “little” adults, and although they can be pompous by the same disorders as adults, their clinical complaints can be very different, especially since they are often incapable of expressing their complaints about their symptoms. Some Vestibular abnormalities can be present in childhood with various and sometimes unspecific symptoms, such as visual disturbance, migraine, unbalance or learning disability[1,2]. The first retrospection in modern scientific literature for

pediatric vertigo was published by Harrison in 1962[3]. Neuhauser et al (2008) situated adult population have reported a 1-year prevalence of 25% for unspecified dizziness and 6% for vertigo [4]. Acute unilateral functional disorders associated with infectious or parainfectious labyrinthids are also more common than in adults. In age between 4 to 10 years, Motion sickness is very common [5]. According to Balatsouras et, 2007 Migraine-associated forms of vertigo are very common in children (BPPV of childhood, vestibular migraine) and for about 50% of diagnoses [6]. In principle, all forms of dizziness known in adult patients can also occur in between children; however, they must gradually be included in the diagnostic test battery of the primary care physician (e.g., vestibular paroxysm) [7]. Sometimes it is difficult to administer a proper diagnosis because children are often unable to describe their complaints (Miyahara et al., 2009). There is a high prevalence rate of vertigo in children reported on an epidemiological study of Jahn and Dieterich, 2011. Hall et al, 1979 and Parnes and McClure, 1992 reported about epidemiological etiology of vertigo in children. The pathophysiological structure of abnormal vestibular function occurred due to presence of particles of calcium carbonate crystals (otoconia) within the semicircular canals which is called canalolithiasis (Brandt et al., 1994b). Adolescents or children differ from adults in the expression of the symptom, the developmental stage of balance and vestibular functions, and the causes of vertigo [8]. For example, BPPV, a common diagnostic group in adults, is rarely seen in children while benign paroxysmal vertigo of childhood (BPVC) and migraine-associated vertigo (MAV) are seen exclusively in children [91011]. *S.H.* Erbek et al, reported that a rate of 5.7% among 10-year-old children in England. Medical history, physical examination including otological and neurological examination allows diagnosis in most pediatric patients without further diagnostic tests [12]. The most crucial factor for delay in diagnosis of pediatric vertigo is lack of awareness regarding its symptomatology and treatment algorithms among the treating physicians. There is limited study on vertigo in pediatric age group and debate on diagnostic criteria and management in this age group. In this study, we assessed the vertigo among pediatric age group. According to O'Reilly et al. reported that 0.4% prevalence of balance impairment related to otologic and neuro-otologic diagnoses, while the prevalence of dizziness and imbalance in the paediatric population has been estimated to be about 5.6% in the United States [13]. Many possibilities aetiologies, a systematic and structured approach, often involving Paediatricians, Neurologists and Otorhinolaryngologists, is always valuable and crucial to avoid misdiagnosis.

The focus of this paper is to assess the literature of the last decade and investigate the prevalence and the different etiologies in the pediatric population.

METHODOLOGY

Dizziness is a general term for a sense of disequilibrium, but Vertigo is a subtype of dizziness, known as an illusion of movement, caused by asymmetric involvement of the vestibular system. Some epidemiologic studies indicate that central vestibular pathology causes are responsible for mostly ¼ were selected, thus not just pointing on a specific diagnostic subgroup. The most common etiology of vertigo are cerebrovascular disorders related to the vertebrobasilar circulation, migraine, multiple sclerosis, tumors of the posterior fossa, neurodegenerative disorders, some drugs, and psychiatric disorders. Keywords used for the search were "vertigo in children" and "dizziness in children".

Inclusion criteria:

1. A chief complaint of vertigo or dizziness within a period of 1 year were selected.
2. with normal hearing sensitivity
3. The age limit of individuals is below 18 years.

Exclusive criteria:

1. Above 18 years individuals are excluded from the study.
2. With any history of conductive pathology like otitis media, otitis externa, CSOM, Cholesteatoma, perforation of eardrums otosclerosis etc (any kind of middle ear pathology)
3. The individuals who did not perform the vestibular or audiological evaluations were excluded.
4. No kind of neurological disorder isn't accepted for this paper.

A total of 15 children (Age limit: 11.67 ± 3.35) with chief complaints of vertigo or dizziness were seen in the REHEAR SPEECH & HEARING CLINIC, Department of Audiology, Burdwan, West Bengal between January 2022 and December 2023. Among them, 10 patients were selected based on a questionnaire including accompanying symptoms, and medical histories of patients and parents.

Vestibular function tests help identify deficits in labyrinthine response to rotational movement, impulsive head movement, caloric stimulation, and position change, as well as screen for abnormalities in ocular motility. Abnormal eye movements associated with vestibular pathology (nystagmus) are often suppressed when examined in a lighted room. With vestibular function testing, the eye movements are recorded with infrared assisted video goggles. These tests have been shown to provide additional diagnostic information when the cause of dizziness is not apparent through clinical examination. Common vestibular function tests include:

1. **VNG (Videonystagmography):** includes rapid position changes of the head and body, and caloric (temperature) stimulation of the inner ear through irrigating the ear canal with different temperatures of water or air.
2. **Puretone Audiometry** provides information regarding the health and integrity of the eardrums, may identify middle ear fluid that can affect balance, and detect auditory asymmetry associated with inner ear or auditory/vestibular nerve pathology.
3. **ROTATIONAL CHAIR:** It is a very sensitive test of inner ear abnormality. The patient is placed in a motorized rotating chair and eye movements are recorded and analyzed.
4. **VEMP (Vestibular Evoked Myogenic Potentials):** responsible for utricle and saccule function.
5. **vHIT (Video Head Impulse Test):** visual stability and focus on objects while moving our head, nature provides us with a vestibular ocular reflex (VOR)
6. **ABR (Auditory Brainstem Response):** The ABR test evaluates the integrity of the auditory/vestibular nerve and serves as a cost-effective screening for acoustic neuroma/ vestibular schwannoma.

All individuals were evaluated with various neurotological tests such as video nystagmography (VNG), craniocorpography (CCG), computerized dynamic visual acuity (DVA), subjective visual vertical (SVV), and puretone audiometry.

Vestibular testing in all children consisted of videonystagmographic (VNG) recording of positional nystagmus, if present, and of the nystagmic response to perrotatory stimulation. All individuals more than 3 years of age were additionally subjected to bithermal caloric irrigation at 30°C and 44°C of each ear.

RESULTS

The average age of patients was 11.67 years with a standard deviation (SD) of 3.35, ranging from a minimum of 3 years to a maximum of 18 years. Among 15 individuals, 9 study participants were males and 6 were female [Table:1].

Table 1 Characteristics of this study participants

Patient's characteristics on presentation	value
Total number of patients	15
Male/Female	9/6
Age (y) at presentation (mean ± standard deviation [SD])	11.67 ± 3.35
Age range (y)	3-18

The common etiology identified for vertigo was vestibular migraine seen in 5 (33.33%) patients. This was followed by unilateral peripheral vestibulopathy seen in 4 (27.67%) patients, bilateral peripheral vestibulopathy in 2 (13.33%) patients, and central vestibulopathy in 1 (6.67%) patient. The other disorders included BPPV and vestibulo-ocular reflex disorder each in 2 (12.33%) patients, and Meniere's disease, meningitis, and phobic postural vertigo in 1 (6.67%) patient each [Fig:1].

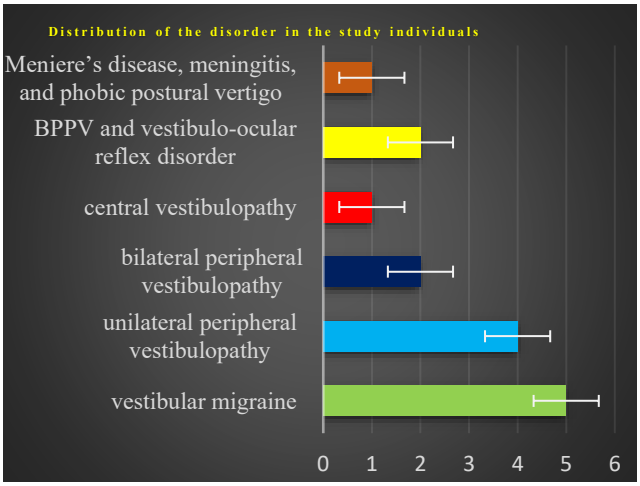

Fig. 1 shows the distribution of the disorder in the study participants.

Table 2 shows the symptoms this study participants presented on their first visit.

Symptoms at presentation	No. of patients	%
Headache	10	66.67
Nausea	7	46.67
Loss of consciousness	5	33.33
Hearing loss	2	13.33
Tinnitus	1	6.67

Vestibular migraine, previously termed BPVC, was seen to be the most common cause of vertigo in children between 7 to 16 years of age. Unilateral and bilateral peripheral vestibulopathy cases were seen more commonly in children between 3 and 6 years of age, whereas central vestibulopathy was seen in children of all ages. Various kind of abnormalities has been seen during evaluation. Migraine-related vertigo was the most frequent diagnosis. Among the migraines, VM was the most represented etiology (73%), followed by Benign Paroxysmal Vertigo of Childhood (BPVC) and other migraine variants, such as basilar migraine or hemiplegic migraine [Fig:3].

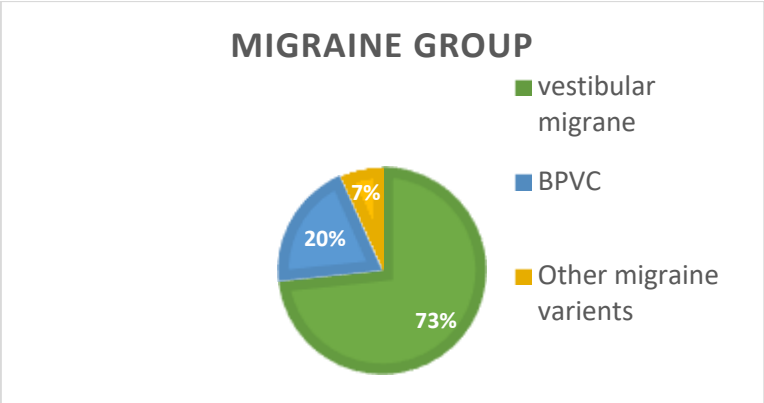

Fig 3: Migraine group analysis

DISCUSSION

Peripheral causes of vertigo first reported by Harrison,1962[15]. The predominance of central pathology such as vertiginous seizures in children and adolescents are reported by Eviatar and Eviatar, 1977 [16]. Sometimes childhood vertigo is caused due to cerebral concussion by Fried [17] & D'Agostino et al [18]. Some recent studies have also described peripheral causes of children's vertigo (Brower and Cotton, 1995) [19]. We had excluded the cases of otitis media; VM was found to be the most common cause of vertigo in children. There are many other studies that showed migraine-associated vertigo in most participants of this study (children and adolescents) [20 21 22 23]. Golz et al stated that middle ear effusion was seen in around 58% of the study population [24.] In our study, VM is the most common cause of vertigo in children (33.33%). In adults, VM and BPPV are seen to be the most frequent causes of vertigo. Meniere's disease is quite uncommon in children, but we found one patient with this disorder in our study may be cause is, median time of onset of MD is 40 Years [25]. Sometime the individual child was misdiagnosed as VM inspite of Meniere's disease [26]. There is a study focusing on unexplained neurological complaints seen in children with vertigo, headache, dizziness, or fainting showed that at least one psychiatric disorder was seen in more than 90% of the participants [27]. A comprehensive otoneurological examination helps achieve correct diagnosis and treatment plan. There are differences in the results seen in our study in comparison to other published literature that can be attributed to the study design and the criteria for inclusion and exclusion. In this study included patients complaining of vertigo and dizziness only. Children with AOM or COM and with previously known neurological deficits were excluded from this study. All the study children completed the VNG examination. Valente stated that determining the underlying causes of vertigo and children, bedside clinical testing and accurate patient history along with laboratory diagnosis and vestibular examination are required to arrive at and ascertain final diagnosis [28]. Absence from school, relationship issues and family conflicts can be red flags of possible depression, which requires psychological/psychiatric consultation [29].

CONCLUSION

Vertigo in children or adolescents must be identified as a definite symptom, which should be taken seriously by the clinician and family person. Pediatric vertigo may occur due to many etiologies. Modernized of taking history and administer of new evaluation method are the only way to diagnose the etiology and site of lesion. Proper diagnosis of vertigo will prevent misdiagnosis and delay in the treatment, which can ultimately lead to deterioration of the quality of life.

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