Original Investigation / Özgün Araştırma

Bedside Vestibular Evaluation of Geriatric Population

Geriatrik Populasyonda Yatakbaşı Vestibüler Değerlendirme

Mesut Kaya[1], Selim Ünsal[2]

[1]*Turgut Ozal University Faculty of Medicine, Department of Otorhinolaryngology, Ankara, Turkey*
[2]*Turgut Ozal University Faculty of Medicine, Department of Audiology and Speech Disorders, Ankara, Turkey*

ABSTRACT

Objective: In this study, evaluation of the bedside diagnostic modalities of the individuals over 65 years old with vertigo and dizziness complaints, thus they might be referred to upper medical centers for treatments.

Methods: 47 individuals (19 male, 28 female) over 65 years old (mean age 74,2 years; 65-84 years), who stay in the private geriatric maintenance centers in Ankara, participated in this study. Subjects were asked about vertigo and dizziness primarily, then they underwent cerebellar, Gait, Babinski-Weil, Past-Pointing, Romberg, Unterberger, Dix-Hallpike and Head-Roll tests, spontaneous and positional nystagmus were recorded.

Results: 26 of the participants declared no vertigo or dizziness and the tests showed no abnormal results. 5 of the rest 21 participants showed spontaneous nystagmus and 2 showed positional nystagmus. 4 subjects had positive Dix-Hallpike test, 10 subjects had positive head-roll test. Additionally, pathological findings on 15 patients and normal findings on 6 patients are obtained in the tests of Gait, Babinski-weil, Past Pointing, Romberg and Unterberger. Also 3 of them showed central vestibular system disturbance findings in addition to vestibulospinal insufficiency and peripheral vestibular pathology.

Conclusion: For the patients with vertigo and dizziness complaint, a total assessment should be done by neurology, physical medicine and rehabilitation, cardiology and other related disciplines. Reformative operations should be applied with multidisciplinary and interdisciplinary approaches, and vestibular rehabilitation programs should be prepared. End this way, qualities of life in geriatric group may be raised by blocking the degradations originating from vertigo and dizziness.

Keywords: Vestibular assessment, nystagmus, geriatric population, rehabilitation

ÖZET

Amaç: Bu çalışmanın amacı; vertigo ve dizzines şikayeti olan ve olmayan 65 yaş üstü bireyleri yatakbaşı testleri ile değerlendirmek ve tedavileri için üst merkezlere refere etmektir.

Yöntemler: Bu çalışmaya Ankara ilindeki özel yaşlı bakım merkezlerinde kalan 65-84 yaş arası (ortalama 74,2) toplam 47 birey (19 erkek, 28 kadın) katıldı. Öncelikle katılımcılara vertigo ve dizziness şikayetleri soruldu. Daha sonra serebellar testler, Gait, Babinski-Weil, Past-Pointing, Romberg, Unterberger, Dix-Hallpike, Head-Roll, spontan ve pozisyonel nistagmus test sonuçları kayıt edildi.

Bulgular: 26 katılımcı vertigo ve dizziness şikayetlerinin olmadığını beyan etmişler ve yapılan test sonuçlarında normal bulgular elde edilmiştir. 21 katılımcının 5'inde spontan nistagmus, 2'sinde pozisyonel nistagmus gözlendi. 4 katılımcıda Dix-Hallpike, 10 katılımcıda Head-Roll testi pozitiftir. Ek olarak, 21 katılımcının 15'inde Gait, Babinski-Weil, Past Pointing, Romberg ve Unterberger testleri patolojik, 6 katılımcının ise normal olarak elde edilmiştir. Ayrıca patolojik bulgu elde edilen 21 katılımcının 3'ünde periferik vestibüler patolojiye ek olarak santral vestibüler sistem bozukluğu bulguları gözlenmiştir.

Sonuçlar: Vertigo ve dizziness şikayeti olan geriatrik gruptaki hastalara özellikle Kulak Burun Boğaz, Nöroloji, Fizik Tedavi ve Rehabilitasyon, Dahiliye, Kardiyoloji ve ilgili diğer bilim dalları tarafından bütüncül bir değerlendirme yapılmalıdır. Multidisipliner ve interdisipliner bir yaklaşımla iyileştirici manevralar uygulanmalı ve vestibüler rehabilitasyon programları hazırlanmalıdır. Bu şekilde vertigo ve dizziness kaynaklı düşmeler engellenerek geriatrik grubun hayat kaliteleri artırılabilir.

Anahtar sözcükler: Vestibüler değerlendirme, nistagmus, geriatrik populasyon, rehabilitasyon

Corresponding Author
Yazışma Adresi

Mesut Kaya
Turgut Ozal University Faculty of Medicine, Department of Otorhinolaryngology, Ankara, Turkey
E-mail: mesutkaya78@yahoo.com

Received/Geliş Tarihi: 01.02.2016
Accepted/Kabul Tarihi: 22.03.2016

Introduction

Vestibular system provides static and kinetic balance with the aid of visual, cerebellar and deep sensory systems. Complete vestibular evaluation tests have to be done in order to diagnose pathologies of these systems and their conjunctions, and to determine whether they are central or peripheral. Vestibular assessment tests are classified in three groups as vestibulospinal reflex (VSR), vestibuloocular reflex (VOR) and rotational tests (1,2). Eye movements enable to follow moving visual subjects in order to foveal fixation. In this way we can view subjects clearly. These movements are performed by ocular motor system, composed of ocular motor nerves and nuclei, cerebral cortex, cerebellum and vestibular structures (3).

Which functional tests of mobility and balance can better screen community-dwelling elderly at risk of falls is unclear. The ability to maintain postural stability is one of the most important factors in fall prediction (4).

In order to assess vestibulospinal system, Romberg, Sensitive Romberg, Babinski-Weil, Gait, Past-Pointing and Unterberger tests can be done. By means of these tests information about VSR and VOR can be obtained. The Vestibulooculer reflex (VOR) functions can be evaluated by Videonystagmography (VNG).

Central or peripheral origin of the pathology determined with aid of VNG (5,6). Positional vertigo, with relocation of otoconia of utricle and saccule through semicircular canals, can be diagnosed using Dix-Hallpike and Head Roll tests (1). According to the obtained results, Benign Paroxysmal Positional Vertigo (BPPV) is diagnosed.

Majority of vertigo and dizziness complaints are seen in geriatric group. Apart from these complaints, metabolic, systemic and neurological problems can also be seen and they reduce the quality of life. The aim of this study is to evaluate vertigo and dizziness complaints with the bedside diagnostic tests, in order to be referred to upper medical centers to provide appropriate treatment.

Material and Methods

Patients: 47 individuals (19 male, 28 female) over 65 years old (mean age 74,2±4,3 years; 65-84 years), who stay in the private geriatric maintenance centers in Ankara, participated in this study. This study was approved by Turgut Ozal University 'Clinical Research Ethics Committee'. Systolic and diastolic blood pressures of the patients are within the normal limits. First, the participants were questioned about vertigo and dizziness, then cerebellar and positional tests were conducted for assessment of VOR and VSR. In addition, spontaneous and positional nystagmuses were observed. As positional tests, Romberg, Sensitive Romberg, Babinski-Weil, Past-Pointing, Unterberger and unilateral, bilateral arm coordination test were done.

The cases who presented central vestibular pathologic findings, were also monitored with gaze, oculomotor and caloric tests in audiology and balance clinic.

In detailed anamnesis, patients with neurologic disease, aural fullness, visual impairment, uncontrolled hypotension, cardiac disease, chronic liver disease, renal insufficiency are excluded from the study. The patients with hearing loss without tinnitus in ear and fullness are included in the study. The biochemical and haematological test results of the patients are obtained in normal limits (retrospectively).

Results

Of the 47 participants, 21 of them had vertigo and dizziness complaints, while the rest 26 participant had no vestibular complaints (Table 1).

We did not observe any pathologic finding with the bedside tests of the group without complaints. The patients, complaining from dizziness and vertigo, also had different problems. 16 of them had hearing loss, 13 of them also had tinnitus, and 10 of them complaining also from hot flush, nausea and vomiting. Existence of these problems is assessed as a supporting evidence for peripheral vestibular pathology.

As an important issue for identification and differential diagnose of central and peripheral vestibular pathologies, positional and spontaneous nystagmus were analyzed, 5 patients showed spontaneous nystagmus, 2 patients showed positional nystagmus. The cases who had shown spontaneous nystagmus, were evaluated as vestibular neuritis. Other symptoms of the patients with vestibular neuritis (sudden onset severe vertigo, upper respiratory tract infection, etc.) support the diagnosis.

In Dix Hallpike test, we observed positive results from 3 patients for right posterior semicircular canal and 1 patient for left posterior semicircular canal.

Table 1. Demographic information and the patients with vertigo /dizziness complaints.

n	Age average	Sex	Vertigo and Dizziness Complaints Present	Vertigo and Dizziness Complaints Absent
47	74,2±4,3	19M/28F	21	26

***M:** Male, **F:** Female*

Table 2. The results of Dix-Hallpike, Head Roll, Positional and Spontaneous Nystagmus

Tests	Number	Diagnosis
Dix-Hallpike	3 Right Ear	3 Right BPPV
Dix-Hallpike	1 Left Ear	1 BPPV
Head Roll Right Ear	7 Right Ear (3 geotropic nystagmus, 4 apogeotropic nystagmus	3 right canalitiasis 4 right cupulolitiasis
Head Roll Left Ear	3 geotropic nystagmus	3 left canalitiasis
Spontaneous Nystagmus	3 Right Beating	3 Left vestibular neuritis
Spontaneous Nystagmus	2 Left Beating	2 Right vestibular neuritis
Positional Nystagmus	2 Positional Nystagmus	2 Peripheral Vestibular Pathology

In Head-Roll test, we observed positive results from 7 patients for right lateral semicircular canal and 3 patients for left lateral semicircular canal. The obtained results from the patients whose Dix-Hallpike and Head Roll are shown in Table 2.

Although normal results had been obtained from 6 cases, abnormal results had been received from 15 cases in Unterberger, Romberg, Gait, Babinski-Weil and Past-Pointing tests for evaluation of VSR, VOR and peripheral vestibular system (In addition to the pathologies obtained in Table 2). This test results are evaluated to the weakness obtained in pathological side.

As to cerebellar tests, 3 cases had failed and so central vestibular pathology and deficiency of vestibulospinal reflex were found for these cases. Videonystagmography (VNG) had been carried out for the participants, who had central vestibular pathology symptoms. Abnormal results had been obtained from oculomotor tests (saccade, pursuit and optokinetic) into VNG and these findings confirmed central vestibular pathology. In the results of saccade tests of three patients, velocity was low. Additionally, there was prolongation in latencies, and hypermetric saccades. In pursuit test, gain was low and asymmetry was available. These results confirm the central vestibular pathology findings.

Discussion

Vertigo and dizziness complaints are seen in all age groups and may reduce their quality of life. This undesirable situation is encountered in geriatric population frequently and complete vestibular assessment tests should be done. Our study is about the early diagnosis, rather than providing a definitive diagnosis, to conduct the patients to the upper healthcare organizations.

According to our results; 21 patients have peripheral vestibular pathology. In addition 3 of these patients have central vestibular symptoms, and VNG tests proved the prediagnose for these 3 patients. Consequently, complete vestibular system assessment should be done for geriatric population suffering from vertigo and dizziness.

Huh et al. (2013) emphasize the significance of bedside vestibular assessment for differentiation of the central and peripheral vestibular pathologies (3). Kerber et al. (2011) have outlined that peripheral vestibular pathologies can be diagnosed by bedside evaluation (6).

Kerber (2009) notified that majority of the vestibular emergencies are consisted of benign paroxysmal positional vertigo (BPPV), Meniere's disease and vestibular neuritis (VN), and these could be determined with the aid of good history of the patient and bedside tests (7).

Tumkaya et al. (2014) researched the distribution of etiology in geriatric group with vertigo. They reported 48.8% peripheral vertigo, 26.8% unknown etiology, 13.4% central vertigo, 9.8% systemic vertigo and 1.2% psychogenic vertigo (12). In our study the rate of peripheric pathology is 85,8%, the rate of central pathology is 14,2%.

Ozono et al. (2014) reported 87,5% peripheral, 12,5% central vestibular pathology in patients admitted to the emergency services with vertigo and dizziness complaints (9). Strupp et al. (2013) reported the rate of central pathology as 12,3% in their review (11).

Katsarkas (1994) finds the rate of BPPV as 39% on 1194 persons who are at age of seventy. In 34% of 47 persons attended our study, both posterior channel and lateral channel BPPV are seen. It is remarkable that lateral canal BPPV is high in geriatric group (13).

Dizziness is a common symptom that affects more than 30% of elderly individuals. In a study of 1622 elderly

patients, dizziness accounted for one-third of all visits to primary care physicians for those older than 65, and was the most common complaint for those older than 75 (14). Seven percent of primary care visits by elderly patients were for symptoms of dizziness (15).

Diagnosis of the underlying etiology and directed therapy is mandatory, since dizziness due to any number of causes can lead to falls with serious consequences in the geriatric population. Fear of falling results in disproportionate reductions in quality of life for the elderly, with nearly one-half of elderly dizzy patients reporting that they restrict their activities due to fear of falling versus 3% of age-matched controls (16).

Falling downs are up to vertigo or dizziness in geriatric population. Kalula et al. (2016) reported that the falling downs are twenty-six percent and itinerant falling downs eleven percent in their study. In this study, it is shown that ethnicity is an important determinant in the falling down of vertigo-dizziness (17).

Schlick et al (2016) reported that the falling downs are the highest position in 569 patients with vertigo and dizziness. In addition to this, itinerant falling downs are more than fifty percent. In this study, it is notified that fear of falling downs and rate of falling down are needed to evaluate in balance disorder. The patients may benefit from vestibular rehabilitation (18).

The degradations geriatric group are the results of vertigo or dizziness. In this study, ethnicity is shown as on important factor in the degradation of vertigo or dizziness. In the study by Carrales and Bhattacharyya (2016) vertigo and dizziness are seen at the rata of eleven percent. They reported that the adults with dizziness have more mortality rates. They found a significant relation between mortality and dizziness. They indicated that dizziness is a risk factor for mortality (19).

Vestibular rehabilitation therapy is a beneficial cure for the elders with imbalance. If the exercise is given to the house, the risk of falling of the elders must be considered. The things at the house are dangerous for the patients. The compensations of (VOR) and (VSR) should be supplied. Apart from improving balance and reducing risk of falling down, exercises decrease the fear of falling down in the elders (20).

47 persons in geriatric group are included to this study. There are many diseases in the geriatric group. To exclude these illnesses is a hard case. That is why, the number of participants is finite number.

According to the obtained results, in geriatric group 85% in peripheral pathology and 15% of central pathology are observed. These results are complete with literature.

It is possible that peripheric pathologies may be fixed with therapeutic maneuvers simply applied (Epley, Barbecue maneuver, Gufani liberatory maneuver, Vannucci maneuver). In central pathologies, multidisciplinary and interdiscipliner approaches are necessary.

Especially VOR and VSR should be improved by evaluating with ENT, Neurology, Physical Medicine and Rehabilitation, Cardiology, Internal Diseases and other discipliners. It is thought that degradations may be blocked in this way. Consequently; in geriatric group, application of vestibular rehabilitation will contribute to the increment of quality of life in this group.

Conclusion

Bedside vestibular assessment tests provide opportunity to determine and separate peripheral and central pathologies. Analyzing and diagnosing vertigo and dizziness complaints in geriatric population is highly important for prevention of geriatric population's falling downs, that may cause several problems.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Turgut Ozal University.

Informed Consent: Written and verbal informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - MK.; Design –M.K.; Supervision – S.U.; Resources - M.K.; Materials - S.U.; Data Collection and/or Processing - M.K.; Analysis and/or Interpretation - S.U.; Literature Search - S.U.; Writing Manuscript - S.U.; Critical Review - M.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Akpinar Z. Vestibular Tests and Their Interpretation: Review. Turkiye Klinikleri J Med Sci 2005; 25: 724-731.
2. Çaylakli F, Ozgirgin N. Clinical Evaluation of Patients with Vertigo. Otoscope 2004; 1: 17-20.

3. Huh YE, Kim JS. Bedside Evaluation of Dizzy Patients. J Clin Neurol 2013; 9: 203-13.
4. Visser JE, Carpenter MG, vander-Kooij H, Bloem BR. The clinical utility of posturography. Clin Neurophysiol 2008; 119: 2424-36.
5. Karatas M. Internuclear and Supranuclear Disorders of Eye Movement. Turk Norol Derg 2009; 15: 54-63.
6. Kerber KA, Baloh RW. The evaluation of a patient with dizziness. Neurology: Clinical Practice 2011; 1: 24-33.
7. Kerber KA. Vertigo and Dizziness in the Emergency Department. Emerg Med Clin North Am 2009; 27: 39-52.
8. Kondo M, Kiyomizu K, Goto F, et al. Analysis of vestibular-balance symptoms according to symptom duration: dimensionality of the Vertigo Symptom Scale-short form. Health Qual Life Outcomes 2015; 13: 4.
9. Ozono Y, Kitahana T, Fukushima M, et al. Differential diagnosis of vertigo and dizziness in the emergency deparment. Acta Otolaryngol 2014; 134: 140-5.
10. Ozunlu A. Electronystagmograhy. Otoscope. 2001; 2: 88-100.
11. Strupp M, Dieterich M, Brandt T. The Treatment and Natural Course of Peripheral and Central Vertigo. Dtsch Arztebl Int 2013; 110: 505–16.
12. Tumkaya F, Ardiç FN, Tumkaya S, Kara CO. Evaluation of the Relation Between Etiologic Distribution and Functional Loss in Patients with Geriatric Vertigo. KBB-Forum 2014; 13: 13-8.
13. Katsarkas A. Dizziness in aging: a retrospective study of 1,194 cases. Otolaryngol Head Neck Surg 1994; 110: 296–301.
14. Sloane PD, Balzer D, George LK. Dizziness in a community elderly population. JAGS 1989; 37: 101–108.
15. Sloane PD, Coeytaux RR, Beck RS, Dallara J. Dizziness: state of the science. Ann Intern Med 2001; 134: 823–832.
16. Burker EJ, Wong H, Sloane PD, Mattingly D, Preisser J, Mitchell CM. Fear of falling in dizzy and nondizzy elderly. Psychol Aging 1995; 10:104–110.
17. Kalula SZ, Ferreira M, Swingler GH, Badri M. Risk factors for falls in older adults in a South African Urban Community. BMC Geriatr. 2016; 16: 212-7.
18. Schlick C, Schniepp R, Loidl V, Wuehr M, Hesselbarth K, Jahn K. Falls and fear of falling in vertigo and balance disorders: A controlled cross-sectional study. J Vestib Res. 2016; 25: 241-51.
19. Corrales CE, Bhattacharyya N. Dizziness and death: An imbalance in mortality. Laryngoscope. 2016 Feb 10. doi: 10.1002/lary.25902.
20. Wolf SL, Barnhart HX, Ellison GL: The effect of tai chi quan and balance training on postural stability in older subjects, Phys Ther 1997; 77: 371.