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Correlation between Dizziness Handicap Inventory and Functional Reach Test in patients with dizziness

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Research Article

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Purpose: The aim of this study was to describe the relationship between self-perceived handicap using the Dizziness Handicap Inventory (DHI) and to analyse whether these measures correlate with Functional Reach Test (FRT) results of individuals with dizziness. **Material and methods:** Twenty patients (mean age=42.8 years) diagnosed having dizziness after otolaryngologic examination and vestibular assessment were asked to complete DHI and perform FRT during the same session in order to determine handicap and severity degree caused by dizziness. **Results:** The DHI was found to be weakly and moderately associated with FRT ($r=-0.5$, $p=0.026$). Functional subscale was found to be weakly and moderately associated with FRT ($r=-0.59$, $p=0.007$). Physical subscale was found to be weakly and negatively associated with FRT ($r=0.42$, $p=0.068$). Emotional subscale was found to be weakly and negatively associated with functional reach ($r=-0.34$, $p=0.14$). The associations between the physical and emotional subscales and DHI were similar but weaker ($r=0.40$ and 0.38 , $p=0.085$ and 0.10 , respectively). **Conclusion:** It is important to determine physical impairment and perceived handicap which affect activities of daily living in patients complaining from peripheral vestibular disorders like dizziness.

Key words: Dizziness, Dizziness Handicap Inventory, Functional Reach Test.

Dizziness olan hastalarda Dizziness Yetersizlik Ölçeği ile Fonksiyonel Uzanma Testi arasındaki korelasyon

Amaç: Bu çalışmanın amacı, *dizziness* şikayeti olan bireylerin *Dizziness Yetersizlik Ölçeği* (DYÖ) ile Fonksiyonel Uzanma Testi (FUT) arasındaki ilişkiyi belirleyerek klinik kullanıma kazandırmaktır. **Gereç ve yöntem:** Kulak Burun Boğaz muayenesi ve vestibüler değerlendirme sonrası *dizziness* tanısı konan 20 hastadan (yaş ortalaması: 42,8 yıl), *dizziness* neden olduğu yetersizliği belirlemek amacı ile DYÖ ve dengeyi değerlendirmek üzere FUT aynı seans içerisinde uygulandı. **Sonuçlar:** DYÖ ile FUT arasında ters yönde orta derecede bir ilişki bulundu ($r=-0.5$, $p=0.026$). Fonksiyonel alt grup ile FUT arasında ters yönde orta derecede ilişkili bulundu ($r=-0.59$, $p=0.007$). Fiziksel alt grup ile FUT doğru yönde zayıf-orta arası derecede ilişkili belirlendi ($r=0.42$, $p=0.068$). Duyusal alt grup ile FUT arasında istatistiksel olarak anlamlı olmayan ters yönde zayıf bir ilişki vardı ($r=-0.34$, $p=0.14$). Fiziksel ve duygusal alt gruplar ile DYÖ arasındaki ilişki de zayıf-orta arası bir kuvvetteydi (sırasıyla $r=0.40$ ve 0.38 , $p=0.085$ ve 0.10). **Tartışma:** Periferik vestibüler bozukluklarda olduğu gibi *dizziness* şikayeti olan hastaların günlük yaşam aktivitelerini sürdürmelerine engel olabilecek fiziksel yetersizlikler ve algıladıkları engellerinin belirlenmesi önemlidir.

Anahtar kelimeler: Dizziness, Dizziness Yetersizlik Ölçeği, Fonksiyonel Uzanma Testi.

Dizziness accounts for most of the primary care visits annually after headache. Vestibular system disorders are the cause of dizziness in approximately 40-50% of patients referred to otologic practices. The symptoms that individuals with dizziness report result in a broad scope of emotions and physical disabilities and inability to perform activities of daily living and/or work, and inconfidence in balance.¹⁻⁴ Therefore, the effect of dizziness on the individual's should be stated in order to determine the appropriate management.²

Health related quality of life encompasses an individual's perception of their quality of life in a series of domains including 1) impairments 2) physical function and performance of daily role activities 3) emotional status 4) social function 5) the individual's general satisfaction and perception of their well being.¹

The Dizziness Handicap Inventory (DHI) which is one of the disease specific questionnaire developed by Jacobson and Newman⁵ for individuals with dizziness or balance problems in order to determine how vertigo or disequilibrium affect individual's quality of life, is composed of physical, functional and emotional domains.^{1,6} The total DHI score was found to be significantly higher as the frequency of vertiginous symptoms increased.²

Yardley et al demonstrated that patients with vertigo experience fear and anxiety from symptoms of vertigo which result in self-restriction of activity.⁷⁻⁹ Fear of vertigo appeared to be the primary reasons for restrictions of activities and performing activities of daily living.^{8,9} Cohen also found a close relationship between dizziness and a broad range of emotional and physical disabilities from dizziness.¹⁰

It is important to understand the relationship between impairment measures and functional limitation tests to health related quality of life.

Balance is assessed with many clinical tests including functional reach. Functional reach uses a voluntary movement to assess an individual's stability limits in the forward reach position and thus is a measure of anterior/posterior stability.¹ Functional Reach Test has the potential to be sensitive to changes in balance¹ and developed by

Duncan et al.¹¹ This test examines the limits of stability in the forward direction which requires an individual to reach forward as far as possible with an outstretched arm.¹¹

The measurement of impairment and functional, emotional, physical disability for individuals with complaints of dizziness can provide guidance to treatment.

Mann et al, noted a correlation between functional reach and the DHI in patients with vestibular dysfunction.¹² Subjects with a DHI score less than 50 could reach farther than subjects with a DHI score greater than 50.

In addition to the tests and measures performed by the patient, gathering self-report information on the loss of balance is very important. Self-report information on conditions of instability can shed light on what aspects of postural control may be impaired.¹³

The purpose of the study was to describe the relationship between the DHI and FRT results of individuals with dizziness.

MATERIALS AND METHODS

Twenty patients (mean age=42.8 years, SD=13.67, range=22-74 years) who suffered from dizziness for at least 3 months, without any neurological problems, were included in this study. The patients referred from Ear-Nose-Throat Department at Hacettepe University and their audiovestibular assessments were done at Audiology and Speech Pathology Unit. The DHI was used to quantify the impact of dizziness on quality of life. Dizziness Handicap Inventory measures self-perceived handicap of dizziness which has been translated into Turkish and the Turkish version has been tested for reliability.¹⁴ The DHI was completed by each subject, or, if the subject was unable to clearly read the questions, it was completed by verbal questioning by the clinician. This instrument provides a total DHI score which is the three scale scores: functional (nine items), physical (seven items) and emotional (nine items). Each question provides a choice of three responses: yes, sometimes, or no. These responses result in four, two, or zero points

respectively. A score of zero indicates dizziness or unsteadiness is not a problem and 100 which was the result of 36 points from functional scale, 28 points from the physical scale and 36 points from the emotional scale, indicates dizziness or unsteadiness is causing severe physical, functional and emotional problems. Scores for each of the DHI subscales were determined.

The patients performed Functional Reach Test (FRT) after completing the DHI questionnaire. The FRT was done while the subjects stood with feet a shoulder distance, the right arm kept extended at 90° with respect to the trunk. During the FRT, the subjects reached as far forward as they can while maintaining their balance. Then, the distance reached was measured.

The DHI scores in this study were categorized into 0–30 (mild handicap), 31–60 (moderate handicap), and 61–100 (severe handicap) to determine if DHI scores were related to physical performance and self-perceived balance confidence.

Statistical analysis:

The FRT values were converted to standardized normal values (z scores) by age and gender adjustment. The associations between FRT and the subscales or the total score of DHI were investigated using the Spearman correlation test. The effect of active work (those with a profession or active student) on DHI and FRT was also analyzed using the Mann-Whitney U test.

RESULTS

The duration of dizziness varied from 3 months to 15 years. The results regarding evaluation methods are summarized in Table 1. The handicap status as defined by the DHI scores were mostly moderate (50%), followed by the mild (35%) and severe (15%) categories.

Functional subscale and total scores for DHI was found to be correlated with functional reach. The DHI was found to be weakly and moderately associated with FRT ($r=-0.5$, $p=0.026$). Functional subscale was found to be weakly and moderately associated with FRT ($r=-0.59$, $p=0.007$). Physical subscale was found to be weakly and negatively

associated with FRT ($r=0.42$, $p=0.068$). Emotional subscale was found to be weakly and negatively associated with functional reach ($r=-0.34$, $p=0.14$). The association between the physical and emotional subscales and DHI were similar but weaker ($r=0.40$ and 0.38 , $p=0.085$ and 0.10 , respectively) (Table 2).

Duration of dizziness was not found to be significantly associated with any component or the total of DHI scores (all $r<0.3$; all $p>0.2$). Active work was not found to be associated with neither DHI nor FRT (all $p>0.15$).

Table 1. Descriptive statistics for the evaluation methods.

	Mean±SD
Functional Reach Test	14.1±3.7
Dizziness Handicap Inventory	
Functional	14.3±9.6
Emotional	11.8±9.0
Physical	14.1±6.8
Total	40.1±3.7

Table 2. Correlation between Dizziness Handicap Inventory scores and its subscales with Functional Reach Test scores.

	FRT
	r (p)
DHI	-0.50 (0.026)
Functional	-0.59 (0.007)
Emotional	0.42 (0.068)
Physical	-0.34 (0.140)

r. Spearman Rank Test coefficient. FRT: Functional Reach Test.
DHI: Dizziness Handicap Inventory.

DISCUSSION

Dizziness is a debilitating condition that can result in handicap. Factors contributing to handicap in patients with dizziness include physical limitations (such as balance problems),

psychological morbidity (such as emotional distress, anxiety and depression) and fear.^{3,8,15} The DHI, which has been shown to be consistent, reliable and valid in quantifying the extent of handicap in patients with dizziness^{5,16,17} has been used widely in research.

The DHI is the self-assessment balance handicap scale which explores the physical and psychosocial impact of balance system disease and maintains psychometric adequacy.⁴ The functional consequences of physical handicap could be seen in the functional aspect of the DHI. From our results it can be concluded that functional subscale of DHI can reflect the functionality of the individual. Therefore, the information can be get from the individuals by questionnaires or surveys, and can be self-completed which can shorten the evaluation duration of the clinician independent of the location.

The emotional domain evaluated the individual's emotional reaction to dizziness. Emotional aspect showed one of the highest degree of handicap due to dizziness, suggesting that patients had not developed good coping mechanisms.

The weak association between physical subscale and FRT can be concluded that dizziness cause less self-perceived physical handicap than the other two subscales.

Studies have shown that balance performance, when measured quantitatively using laboratory testing, does not necessarily correspond to the extent of handicap in patients with dizziness, with correlations ranging from weak to moderate.^{15,17-19} Computerized dynamic posturography is a widely accepted method to evaluate balance disorders. However, the correlation between computerized dynamic posturography scores and the DHI varied among several studies from low to moderate.^{15,17} Robertson and Ireland²⁰ reported no relationship between the DHI and computerized dynamic posturography, yet Badke et al²¹ reported that preoperative computerized dynamic posturography scores were highly associated with DHI scores in persons with acoustic neuromas.

The DHI is a simple questionnaire to quantify person's perceived handicap from their dizziness

as well as functional reach is a simple balance measure that is easily incorporated into clinical practice and can be performed in any setting.^{3,4,22} So, those two measures can be used to quantify dizziness instead of computerized posturography in any settings and conditions.

Not all persons with vestibular disorders experience both dizziness and imbalance. Identifying positions or situations that exacerbate or relieve the symptoms can afford valuable insight into the cause of the problem. Gaining an understanding of the magnitude of the functional deficits is very important.²³

Quantification of the movements and the positions that trigger symptoms of dizziness not only provides information on the cause of the symptoms but may also help in selecting activities for treatment.²³

People who suffer from dizziness restrict their activities according to self-perceived handicap. As it can be seen from Table 1 and 2, all of the patients are at risk of falling with 15% is at severe, 50% is at moderate and 35% is at mild risk.

In conclusion, disease specific questionnaires have provided evidence that general health is affected by vestibular dysfunction or dizziness.^{8,9} Performance measures may be especially useful to detect preclinical changes at the highest level of function. The idea that physical performance measures are better than self-reports has been challenged.²⁴ Even if physical performance measure are not proven superior to self-report, they're providing good ways to determine function.

Vestibular rehabilitation programs including balance training, strengthening, repetitive head movements, purposeful activities that incorporate repetitive head movements and gaze stabilization exercises can be useful for vestibular rehabilitation. However, patients suffering from dizziness need multidisciplinary approach in order to continue their normal daily living activities. The programs developed by physical therapist are helpful for patients suffering from dizziness.

It is important to have measures of patients complaining from peripheral vestibular disorders like dizziness, vertigo or unsteadiness in order to

correlate quantified physical impairment and self-perceived handicap to conduct the activities of daily living. Both DHI and FRT can guide the clinician regarding the efficiency of vestibular rehabilitation and progress of patients suffering from dizziness.

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Appendix.**Dizziness Handicap Inventory**

The purpose of the scale is to identify difficulties that you may be experiencing because of your dizziness/unsteadiness. Please check off "Yes", "Sometimes", or "No" to each item. Answer each question as it pertains to your dizziness/unsteadiness only.

	Yes	Sometimes	No
P1. Does looking up increase your problem?			
E2. Because of your problem, do you feel frustrated?			
F3. Because of your problem, do you restrict your travel for business or recreation?			
P4. Does walking down the aisle of a supermarket increase your problem?			
F5. Because of your problem, do you have difficulty getting into or out of bed?			
F6. Does your problem significantly restrict your participation in social activities such as going out to dinner, going to movies, dancing, or to parties?			
F7. Because of your problem, do you have difficulty reading?			
P8. Does performing more ambitious activities like sports, dancing, household chores such as sweeping or putting dishes away increase your problem?			
E9. Because of your problem, are you afraid to leave your home without someone accompanying you?			
E10. Because of your problem, have you been embarrassed in front of others?			
P11. Do quick movements of your head increase your problem?			
F12. Because of your problem, do you avoid heights?			
P13. Does turning over in bed increase your problem?			
F14. Because of your problem, is it difficult for you to do strenuous house work or yard work?			
E15. Because of your problem, are you afraid people may think you are intoxicated?			
F16. Because of your problem, is it difficult for you to go for a walk by yourself?			
P17. Does walking down a sidewalk increase your problem?			
E18. Because of your problem, is it difficult for you to concentrate?			
F19. Because of your problem, is it difficult for you to walk around your house in the dark?			
E20. Because of your problem, are you afraid to stay home alone?			
E21. Because of your problem, do you feel handicapped?			
E22. Has your problem placed stress on your relationships with members of your family or friends?			
E23. Because of your problem, are you depressed?			
F24. Does your problem interfere with your job or household responsibilities?			
P25. Does bending over increase your problem?			
Score			

Adapted from: Jacobson GP, Newman CW. The development of the dizziness handicap inventory. Arch Otolaryngol Head Neck Surg 1990;116:424-427, Copyrighted 1990, American Medical Association.