Balance Function Test Correlates of the Dizziness Handicap Inventory

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Abstract

Balance Function test data alone cannot capture the reaction that a patient has to balance system disease. The present investigation examined the relations among components of the balance function examination (electronystagmography, rotational testing, and platform posturography) and self-perceived dizziness handicap, as quantified by the Dizziness Handicap Inventory (DHI). The DHI is a 25-item self-assessment scale designed to quantify the functional, emotional, and physical effects of dizziness and unsteadiness. The DHI was administered to 367 patients seen consecutively for balance function evaluations. The results indicated that the largest proportion of significant correlations existed between DHI and the sensory organization subtests of platform posturography. Further, greater perceived handicap was documented for patients with (1) spontaneous nystagmus and (2) decreased postural stability quantified by evaluating the inter-relations among vestibular, visual, and proprioceptive systems (posturography).

Key Words: Balance function, dizziness, electronystagmography (ENG), handicap, posturography, rotary chair testing

The results of conventional balance system examinations (e.g., electronystagmography, rotational testing) are unable to provide insight into the impact that balance system disease has on a patient’s ability to function in daily life. In view of the apparent shortcomings of the conventional balance function test battery, the Dizziness Handicap Inventory (DHI) was developed to evaluate the self-perceived handicapping effects of balance system disease (Jacobson and Newman, 1990). The DHI (see Appendix A) consists of 25 items derived from three content domains believed to encompass the functional (i.e., the effects of balance system disease on a person’s ability to conduct their everyday activities), emotional (i.e., the effects of balance system disease on a person’s emotional well-being), and physical impacts (i.e., the effects of physical activities on a person’s sense of instability) of balance system disease. In a previous report, the development of this scale was described (Jacobson and Newman, 1990). It was found that the DHI has good face validity, high internal consistency reliability (Cronbach’s alpha = 0.78 to 0.89), and high test-retest reliability (r = 0.92 to 0.97). It was also reported that there was no predictable relationship between the total score on the DHI and the percent unilateral weakness on alternate binaural bithermal caloric testing. The purpose of the present investigation was to explore further the relations among results of various indices of balance system function and patient’s self-perceived handicap as quantified by the DHI.

METHOD

Subjects

Subjects were 367 adults (128 male, 239 female) seen consecutively for balance function
evaluations conducted at Henry Ford Hospital (GPJ, CWN) or at the Minneapolis Neuroscience Institute (LH, GKB). The mean age of the subject sample was 48.84 years (SD = 14.51 yr) with a range from 17 to 85 years.

Procedures

The DHI is a 25-item self-assessment scale composed of a 9-item functional subscale, a 9-item emotional subscale, and a 7-item physical subscale. A “yes” response to an item is awarded 4 points; a “sometimes,” 2 points; and a “no,” 0 points. Possible scores on the DHI range from 0, suggesting no handicap, to 100, indicating significant perceived handicap. The DHI was administered to each of the 367 patients prior to balance function testing using a face-to-face format. Patients underwent electronystagmography (ENG), and/or rotational testing, and/or platform posturography (EquiTest). The numbers of patients administered each examination are summarized in Table 1.

A conventional ENG examination was performed using techniques that have been described extensively elsewhere (Jacobson and Means, 1985; Jacobson and Henry, 1989; Jacobson et al, 1990). Two channels of electro-oculographic data were recorded in the course of the examination (i.e., bitemporal electrode derivation and vertical electrode derivation with electrodes placed above and below the eye with better sight). In addition to a hard copy printout, all data were stored on magnetic media for offline analysis (ICS Mastr System). The ENG examination consisted of the following tests: (1) saccade system testing, (2) tests for horizontal and vertical gaze-evoked nystagmus, (3) optokinetic nystagmus (with a series of LED targets that moved sequentially through the visual field at a rate of 15 degrees per second and 30 degrees per second), (4) pursuit system testing (0.1 to 0.7 Hz), (5) spontaneous nystagmus testing, and (6) positioning testing (Dix-Hallpike maneuver) for all subjects who were free of disease involving the cervical vertebrae, (7) position testing to detect position-induced nystagmus in the supine, right and left lateral, and head-hanging positions, and (8) caloric testing according to the Fitzgerald and Hallpike (1942) procedure (N = 333) in a manner described by Barber and Stockwell (1980) or monothermal warm caloric testing (N = 12) in a manner described by Jacobson and Means (1985).

Computerized rotational testing was conducted with a Neurokinetics, Model 1010 rotary chair system. Bitemporal ENG recordings were conducted while each patient was rotated at 0.01 Hz, 0.04 Hz, 0.16 Hz, 0.32 Hz, and 0.64 Hz (maximum velocity, 50 degrees/second; maximum acceleration, 3 degrees/second², 13 degrees/second², 50 degrees/second², 101 degrees/second², and 201 degrees/second² for frequencies 0.01 Hz, 0.04 Hz, 0.16 Hz, 0.32 Hz, and 0.64 Hz respectively). Vestibulo-ocular reflex (VOR) gain, phase, and asymmetry were quantified.

The EquiTest (NeuroCom, Clakamas, OR) platform posturographic protocol consists of both sensory organization and motor coordination subtests. Of particular interest is the Sensory Organization Test (SOT). The test consists of 6 differing conditions of increasing difficulty. Each condition has three trials each lasting 20 seconds. For each trial, the subject is asked to remain as stable as possible. In Condition 1, the subject is asked to stand, face forward, and stare at a horizon painted on a cloth visual surround. Condition 2 is the same as the first with the exception that the subject is asked to close their eyes (e.g., conventional Romberg). Under this condition the subject is deprived of visual input and must rely on somesthetic and vestibular inputs to remain upright. In Condition 3, the patient faces forward with eyes open, however, if they sway forward or backward the scene sways with them. In this “vision sway-referenced” condition the subject is presented with conflicting visual information (e.g., they are swaying, yet the visual modality is providing information to the CNS that they are standing upright). In Condition 4, the subject is asked to face forward with eyes open, however, if they sway forward or backward the platform sways with them. Under these “support sway-referenced” circumstances the subject is presented with inaccurate proprioceptive information and
must suppress it. In Condition 5, the subject is asked to close his or her eyes and the support surface is sway-referenced. The subject must rely solely on accurate vestibular system input to remain upright in this condition. Finally, in Condition 6, both vision and support information is sway-referenced so that subjects must suppress inaccurate visual and proprioceptive information in order to remain upright. The variable that is quantified by the Equitest program is the maximum peak-to-peak sway (measured in degrees). The limits of sway in normal subjects is approximately 12 degrees. Therefore, sway that is greater than 12 degrees is outside the limits of stability and will lead to a fall. The results of the SOT are plotted on a scale from 0 to 100 percent with 100 percent representing complete stability and 0 percent representing the limits of stability (e.g., a fall).

**Data Analysis**

The total caloric response (i.e., summation of average maximum slow component velocity [SCV] for left and right warm caloric irrigations and left and right cool caloric irrigations) on alternate binaural bithermal caloric testing, total warm maximum SCV, total cool SCV, percent unilateral weakness, and directional preponderance was tabulated from the ENG examinations.

The degrees phase lead (+ degrees) or lag (- degrees), VOR gain, and percent asymmetry for the five chair frequencies (0.01 Hz, 0.04 Hz, 0.16 Hz, 0.32 Hz, and 0.64 Hz) were tabulated from rotational testing.

Additionally, the average equilibrium score (average of three trials) for each of the six conditions of the SOT was calculated and tabulated for platform posturography. Finally, all of these values were cross-correlated with the total score and subscale scores of the DHI.

**RESULTS**

Pearson product-moment correlations were calculated to determine the degree of relationship of balance function testing measures and DHI scores.

**Functional Subscale-DHI**

The functional subscale demonstrated significant correlations only with the posturographic variables. Moderate statistically significant negative correlations were observed between results of SOT Conditions 2 (r = -0.39, p = 0.001); 3 (r = -0.29, p = 0.02); 4 (r = -0.40, p = 0.001); 5 (r = -0.48, p = 0.0001); and 6 (r = -0.41, p = 0.0007) and the functional subscale.

**Emotional Subscale-DHI**

The emotional subscale demonstrated significant correlations only with rotational and posturographic variables. The emotional subscale demonstrated a weak significant positive correlation with phase data at the 0.01 Hz (r = 0.11, p = 0.01) and 0.64 Hz chair frequencies (r = 0.18, p = 0.001). A moderate statistically significant negative correlation was observed between results of SOT Conditions 2 (r = -0.35, p = 0.004); 4 (r = -0.30, p = 0.01); 5 (r = -0.39, p = 0.001); and 6 (r = -0.37, p = 0.003) and the emotional subscale.

**Physical Subscale-DHI**

Only one significant relationship was observed between the physical subscale of the DHI and the balance function test variables. The physical subscale showed a moderate, statistically significant negative correlation with the equilibrium score on Condition 2 of the SOT (r = -0.28, p = 0.02).

**Total Score-DHI**

The total scores on the DHI showed weak but significant positive correlations with VOR phase at 0.01 Hz (r = 0.11, p = 0.04) and 0.64 Hz chair frequencies (r = 0.12, p = 0.02). A moderate statistically significant negative correlation was observed between results of SOT Conditions 2 (r = -0.39, p = 0.001); 4 (r = -0.36, p = 0.004); 5 (r = -0.42, p = 0.0005); and 6 (r = -0.35, p = 0.004) and the total DHI score.

A stepwise linear regression was conducted to determine whether DHI total and subscale scores could be predicted on the basis of the combination of one or more of the values derived from balance function test results (Table 2). Results of these analyses suggested that a combination of equilibrium scores on Conditions 3 and 5 and phase data at 0.01 Hz on rotary chair testing were most predictive of the functional subscale score. Condition 5 of the SOT was most predictive of the emotional and total subscale scores. No combination of balance function test values was found to be predictive of the physical subscale score. Corrected coefficient of multiple determinations were 0.29, 0.18, and 0.16 for the
Table 2  Results of Stepwise Linear Regression Analysis Evaluating the Ability of Balance Function Test Variables to Predict DHI Subscale and Total Scores

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable Entered</th>
<th>Multiple ( r )</th>
<th>( r^2 )</th>
<th>Increase in ( r^2 )</th>
</tr>
</thead>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>0.44</td>
<td>0.19</td>
<td>0.19</td>
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<tr>
<td></td>
<td>SOT-Equilibrium Test 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rotation Phase 0.01 Hz</td>
<td>0.51</td>
<td>0.26</td>
<td>0.07</td>
</tr>
<tr>
<td>3</td>
<td>SOT-Equilibrium Test 3</td>
<td>0.58</td>
<td>0.34</td>
<td>0.08</td>
</tr>
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<tr>
<td>Emotional Subscale</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SOT-Equilibrium Test 5</td>
<td>0.42</td>
<td>0.18</td>
<td>-</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Physical Subscale*</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.40</td>
<td>0.17</td>
<td>-</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Subscale</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SOT-Equilibrium Test 5</td>
<td>0.40</td>
<td>0.17</td>
<td>-</td>
</tr>
</tbody>
</table>

*No variable or combination of variables were found to be predictive of Physical Subscale scores on the DHI.

Functional and emotional subscales and total score respectively. Thus, balance function test values accounted for at best 29 percent of the total variance in the data.

Performance on DHI in the Presence of Compensated/Uncompensated Vestibular System Disease

An attempt was made to determine whether a patient with uncompensated vestibular system disease demonstrated greater self-perceived balance handicap (as quantified on the DHI) in comparison to patients with compensated disease. The decision as to whether a vestibular system deficit was classified as compensated or uncompensated was based on a combination of results obtained from caloric and rotational testing. That is, vestibular system disease was classified as uncompensated if: (1) caloric testing yielded a significant unilateral weakness (i.e., > 20% left/right difference based on laboratory normative data) and (2) on rotational testing, asymmetry values were greater than 2.5 standard deviations away from the mean at two or more adjacent chair frequencies. If a significant unilateral weakness was coupled with rotational testing asymmetries, which fell within ± 2.5 standard deviations from the mean chair frequency values, the vestibular system was classified as compensated.

A subgroup of 314 patients who underwent both rotational and caloric testing and whose rotational and caloric examinations showed evidence of significant unilateral disease was selected. Thus, it was possible to separate the subgroup into 82 subjects with uncompensated peripheral vestibular system disease and 232 subjects with compensated vestibular system disease based on rotational findings. A t-test for independent samples was used to evaluate group differences on the functional, emotional, and physical subscales and the total score on the DHI. None of these group comparisons reached statistical significance (p < 0.05).

Performance on DHI in the Presence of Spontaneous Nystagmus

It has been hypothesized by Coats (1969) and Stockwell (1990) that the presence of spontaneous nystagmus reflects a resting asymmetry in afferent activity from the peripheral vestibular system. These same investigators have stated that spontaneous nystagmus is clinically significant only when the SCV exceeds 6 to 10 degrees/second. Spontaneous nystagmus with SCV exceeding 6 to 10 degrees/second is commonly observed in patients with acute unilateral peripheral vestibular system disease. In these instances, the spontaneous nystagmus fast phase is directed toward the unimpaired ear. An analysis was conducted to determine whether patients with spontaneous nystagmus SCVs of greater than 6 degrees/second had greater self-perceived balance handicap than those patients without spontaneous nystagmus.

There were 97 subjects with spontaneous nystagmus (i.e., > 6 degrees/second) and 248 subjects without spontaneous nystagmus who underwent full ENG examinations. Group comparisons were evaluated with a t-test for independent samples. Again, mean differences were small, however, the results of these analyses indicated that patients with clinically significant spontaneous nystagmus had significantly greater self-perceived balance handicap as reflected in the functional (mean difference = 3.65, \( t = 2.58, df = 343, p = 0.005 \)) and emotional (mean difference = 2.46, \( t = 2.46, df = 343, p = 0.007 \)) subscale scores and in the total DHI score (mean difference = 6.14, \( t = 2.37, df = 343, p = 0.009 \)). No significant group differences were observed for the physical subscale (mean difference = 0.82, \( t = 0.95, df = 343, p = 0.17 \)).
Intercorrelations between DHI Subscales and Total Scores

Pearson product-moment correlations were calculated to determine the degree of relationship between the three DHI subscales and the total score. As demonstrated in Table 3, the correlations between the subscales and the total score were moderate-high ($r = 0.53$ to $0.86$).

DISCUSSION

In the last 15-year period, the conventional vestibulometric assessment has been expanded to include computerized rotational testing and platform posturography. The addition of the latter evaluation technique has required that the term "vestibular function testing" be replaced with the more appropriate term "balance function testing." Both the ENG and rotational examinations have appeared to suffer from problems associated with tests that have poor face validity, namely: the results of these examinations have little to do with, and are not predictive of, how a patient interacts with their environment once they leave a physician's office. The development of the DHI has been an attempt to address this need.

The purpose of the present investigation was to determine the degree of association between tests of balance function and a measure of self-perceived balance handicap the DHI. Tests of balance function yielded 26 variables: five ENG-related; 15 from rotational testing; and six variables being drawn from platform posturographic measures. Thus, it was possible to have a total of 104 significant correlations between balance function variables and DHI measures (26 variables x 3 subscales and the total DHI score). Significant correlations were obtained only for 18 of these relationships. It is noteworthy that 14 of these significant correlations (78% of total) involved the sensory organization subtests of platform posturography (e.g., Conditions 2, 3, 4, 5, and 6). The most consistent trend was the significant negative correlations between the total score, functional and emotional subscales, and Conditions 2, 3, 4, 5, and 6 on the SOT. That is, as the patient's stability on these conditions decreased, the patient's self-perceived handicap increased.

Another four of the significant correlations (22% of the total) involved rotary chair variables. Interestingly, these correlations involved comparisons between the total, functional, and emotional subscale scores and increases in phase (i.e., abnormal phase leads) at the lowest (0.01 Hz) and highest (0.64 Hz) chair frequencies. It is known that patients with unilateral peripheral vestibular system disease often demonstrate significant phase abnormalities at low rotational frequencies even after central vestibular compensation has occurred (Suzuki et al, 1989). Additionally, Gresty et al (1977) observed high frequency phase and gain abnormalities in subjects with peripheral vestibular system disease. Interestingly, it is high frequency head movements that are encountered during everyday life. High frequency VOR deficits are often associated with the troublesome complaint of oscillopsia in these patients.

Table 3 Intercorrelations between Subscale Scores and the Total Score on the Dizziness Handicap Inventory (DHI)*

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Emotional</th>
<th>Physical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional</td>
<td>1.00</td>
<td>0.61</td>
<td>0.53</td>
<td>0.75</td>
</tr>
<tr>
<td>Emotional</td>
<td>–</td>
<td>1.00</td>
<td>0.55</td>
<td>0.86</td>
</tr>
<tr>
<td>Physical</td>
<td>–</td>
<td>–</td>
<td>1.00</td>
<td>0.80</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Significance levels all exceeded $p < 0.0001$.  

Correlations between DHI and Platform Posturography

The sensory organization subtest of the Equitest protocol provides a means of examining postural stability as various sensory inputs required for stability are removed systematically (i.e., loss of vision with eyes closed), attenuated (i.e., attenuating proprioceptive information by sway-referencing the platform), or distorted (i.e., distorting vision by sway-referencing the surround). Because the interplay of visual, vestibular, and proprioceptive inputs orients us in space and stimulates the balance system to respond when the need arises, it is understandable that deficiencies in balance, as identified through platform posturography, were associated with high scores (greater self-perceived handicap) on the DHI. Therefore, the preponderance of significant correlations of DHI and the SOT of posturography obtained in the present study suggest that the SOT is a valid criterion variable for evaluating the handicapping effects that balance system disease has on a patient's self-perceived ability to function in daily life. Moreover, SOT coupled with the scores obtained from the DHI could be used as outcome measures for documenting treatment benefit
when used in a pretreatment/post-treatment protocol.

**Uncompensated Peripheral Vestibular System Disease**

Patients with uncompensated peripheral vestibular system disease as operationally defined in the present investigation (i.e., significant unilateral weakness with rotary chair asymmetries at two or more adjacent frequencies) failed to demonstrate poorer DHI scores than patients with compensated deficits (i.e., unilateral weakness with no rotational asymmetries). This is not surprising since rotational asymmetries in most patients occurred at lower rotational frequencies (i.e., 0.01 and 0.04 Hz). It is known that frequencies encountered in daily life exceed 1 Hz (Gresty et al., 1977; Fineberg et al., 1987). Thus, subjects with uncompensated peripheral vestibular system disease, as defined herein, would not be expected to encounter difficulties during natural movements in daily life. Therefore, these individuals would not express perceptions of increased balance handicap.

**Peripheral Vestibular System Disease with Spontaneous Nystagmus**

It is common for patients with acute unilateral peripheral vestibular system disease to demonstrate spontaneous nystagmus. The presence of clinically significant spontaneous nystagmus is felt to be an explanation for the finding of a significant directional preponderance on caloric testing. In the present investigation it was revealed that patients with direct electrophysiologic evidence of acute unilateral vestibular system disease (i.e., spontaneous nystagmus with SCVs exceeding 6 degrees/second) had significantly greater self-perceived balance handicap, as demonstrated on the functional, emotional, and total scores on the DHI. It is understandable that a patient with uncompensated peripheral vestibular system disease might have difficulties ambulating or might want to limit their activities. Postural reflexes that are modulated by the intact vestibular system become facilitated in the presence of unilateral disease. These unimpeled reflexes result in postural instability (Fulton et al., 1930; Bach and Magoun, 1947; Allum and Pfaltz, 1984; Allum et al., 1988). Thus, the DHI appeared to be sensitive to the functional and emotional effects of postural instability caused by acute unilateral peripheral vestibular system disease as verified by the presence of spontaneous nystagmus.

**Intercorrelations between Subscale Scores and Total Score-DHI**

Intercorrelations between the total and subscale scores on the DHI were highly significant. The correlations ranged from 0.52 to 0.86 and are shown in Table 3 (Significance levels all exceeded p < 0.0001). These findings support the observation of the high internal consistency reliability (r = 0.89) of the DHI that was reported in our initial investigation (Jacobson and Newman, 1990). It is interesting that the physical subscale showed the lowest intratest correlations (i.e., ranging from r = 0.52 to 0.80) and the fewest number of cross-correlations with balance function test variables. We are presently reevaluating the contribution that this subscale makes to the DHI measure. It is possible that just as age and gender failed to demonstrate predictable relationships with the total score or subscale scores on the DHI (Jacobson and Newman, 1990) that the items comprising the physical aspects of balance handicap may not adequately describe the magnitude of this handicap. It may be more the effect that the condition imposes upon a patient’s ability to cope with life than the physical limitations that the condition imparts.

**Cross-Study Comparisons**

Several interesting comparisons can be drawn from the results of the present investigation and those observed in studies exploring the audiometric correlates of hearing handicap. The magnitude of the relationships between balance function test measures and DHI scores are similar to those observed between audiometric variables and hearing handicap scales. Moderate correlations have been reported between pure-tone sensitivity measures and a number of hearing handicap inventories (Noble, 1978; Rosen, 1978; Weinstein and Ventry, 1983a). Weak correlations have been observed between suprathreshold word recognition ability and several different scales and age groups (Berkowitz and Hochberg, 1971; McCartney et al., 1976; Noble, 1978; Newman et al., 1990). These findings suggest that hearing handicap is a complex phenomenon that takes into account a number of extra-audiologic variables including, health, personality, and lifestyle.
In conclusion, scores on the DHI were most highly correlated with a patient's ability to remain upright as quantified by platform posturography and minimally correlated to vestibulometric measures, including ENG and rotary chair testing. Despite the statistically significant correlations between balance function testing and perceived dizziness handicap, more than 77 percent of the variance in self-assessed dizziness handicap remains unexplained by the balance function test measures studied. Thus, as with hearing handicap, a number of extravestibular/postural factors (e.g., general health, visual acuity, orthopedic, and psychological status) contribute to an individual's response to balance system disease.

CONCLUSIONS

In this connection, Weinstein and Ventry (1983b) reported that audiometric measures explain less than 50 percent of the variance associated with hearing handicap as measured by the Hearing Handicap Inventory for the Elderly. Similarly, in the present report, weak to moderate correlations were observed between balance function test measures and DHI scores. The Index of Determination ($r^2$) indicated that decreased end organ sensitivity at low and high rotary chair frequencies accounted for as little as 1 to 3 percent of the variance in the DHI scores. Moreover, maintenance of postural stability through integration of vestibular, visual, and proprioceptive information, as quantified by posturography, accounted for 8 to 23 percent of the variance in the total score and the functional, emotional, and physical subscale scores. Accordingly, a large proportion of the variance in self-perceived dizziness handicap remains unexplained by the balance function test measures studied. Thus, as with hearing handicap, a number of extravestibular/postural factors (e.g., general health, visual acuity, orthopedic, and psychological status) contribute to an individual's response to balance system disease.

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REFERENCES


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APPENDIX A

Dizziness Handicap Inventory

Instructions: The purpose of this scale is to identify difficulties that you may be experiencing because of your dizziness or unsteadiness. Please answer “yes,” “no,” or “sometimes” to each question. Answer each question as it pertains to your dizziness or unsteadiness problem only.

P1. Does looking up increase your problem?
P2. Because of your problem do you feel frustrated?
P3. 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?
P5. Because of your problem do you have difficulty getting into or out of bed?
P6. Does your problem significantly restrict your participation in social activities such as going out to dinner, movies, dancing, or parties?
P7. Because of your problem do you have difficulty reading?
P8. Does performing more ambitious activities like sports, dancing, and household chores such as sweeping or putting dishes away increase your problem?
P9. Because of your problem are you afraid to leave your home without having someone accompany 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 housework 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?

A “yes” response is scored 4 points. A “sometimes” response is scored 2 points. A “no” response is scored 0 points.

F represents an item contained on the functional subscale; E represents an item contained on the emotional subscale, and P represents an item contained on the physical subscale.