A COMPARISON OF VESTIBULAR REHABILITATION APPROACHES ON BALANCE IN HEARING IMPAIRED CHILDREN WITH VESTIBULAR DYSFUNCTION

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ABSTRACT

Introduction: Vestibular dysfunction leads to dizziness symptoms and balance impairments in individuals. Vestibular Rehabilitation Therapy (VRT) is a highly effective in improving balance impairments. This study mainly aims to compare the effect of Gaze Stability exercises and Brandt – Daroff exercises on balance in vestibular dysfunction in children with hearing impaired. Objectives: 1. To study the effect of Gaze Stability exercises on balance in hearing impaired children with vestibular dysfunction. 2. To study the effect of Brandt- Daroff exercises on balance in hearing impaired children with vestibular dysfunction. 3. To compare the effect of gaze stability exercises and Brandt – Daroff exercises on balance in hearing impaired children with vestibular dysfunction. Methodology: Thirty one hearing impaired children between the ages of 10 to 17 with positive symptoms of vestibular dysfunction in any two tests out of the following - Dix Hall Pike maneuver, Fukuda Step test, Roll’s test and Sharpened Romberg’s test were selected. Baseline evaluation for balance assessment was done using Pediatric Balance Scale. The values obtained pre and post interventions were recorded. Children were divided into two groups, one group received Gaze Stability exercises and the other group received Brandt- Daroff exercises. Both groups received the treatment for 10 days. Result: There was significant improvement in (p<0.001) in balance for Pediatric Balance Scale in both the groups. Both groups showed improvement in balance. However, the group which received Gaze Stability
exercises showed more improvement than the Brandt- Daroff exercise group. **Conclusion:**
The results of this study conclude that Gaze Stability exercises and Brandt- Daroff exercises are effective in treating vestibular dysfunction in hearing impaired children and helps improve balance. Gaze Stability exercises clinically showed a better outcome than Brandt- Daroff exercises.

**KEYWORDS:** Gaze Stability Exercises, Brandt- Daroff Exercises, Vestibular Dysfunction, Balance.

**INTRODUCTION**
Vestibular dysfunction causes dizziness and balance impairments especially with head movements such as when turning to look at something, poor spatial relationships sometimes revealed by skipping words or letters while reading or by having a disorganized writing style, nystagmus (involuntary, alternating, rapid and slow eye movements), difficulty navigating in the dark, hearing loss or tinnitus (ringing in the ears), motion sickness or sensitivity (avoids or craves movement), nausea, abnormal movement patterns, unsteady gait, clumsiness (including decreased eye-hand and eye-foot coordination), or poor posture, developmental reflex delays that are sometimes revealed by slower achievement of milestones.\(^1\)

Vestibular dysfunction is divided into two type’s namely central and peripheral vestibular dysfunction. In vestibular dysfunction, some of the signs and symptoms are as follows: - vertigo (i.e. an illusory sense of motion), nystagmus (involuntary movement of eyes-dancing eyes), visual instability on head movement, blurring or double vision, spinning sensation or dizziness, may or may not have hearing loss or tinnitus, may be fearful of movement activities, asymmetrical posturing in sitting or standing, incoordination, disequilibrium (sense of balance loss). A positive dynamic visual acuity test, below – age level balance abilities (eg. Tandem, single leg – stance), below age level vestibular ratio (also vision and somatosensory ratios, if since birth) on sensory organization test; may or may not show increased latency on dynamic perturbation test, hypoactive or hyperactive responses on post – rotatory nystagmus test.\(^2\)

The main aims of physical therapy intervention in vestibular dysfunction are to decrease the patient’s disequilibrium (sense of being off-balance), improves the patient’s functional balance during ambulation, improve the patient’s overall general physical condition and
activity level, enable the patient to return to a more normal level of participation in society, and reduce the patient’s social isolation.\textsuperscript{[1]}

Gaze Stability exercises and Brandt-Daroff exercises are two common vestibular rehabilitation approaches used for improving balance in vestibular dysfunction.\textsuperscript{[1]}

Gaze Stability exercises are adaptation and substitution type of exercises. These exercises modify ability of the vestibular system to modify magnitude of vestibulo-ocular reflex (VOR) in response to a given input (head movement). Adaptation of VOR occurs to a combination of retinal slip with head movement. In these exercises an individual performs rapid active head rotations while watching a visual target, while maintaining focus on the visual target during head movements.\textsuperscript{[3]}

Brandt-Daroff exercises are a type of habituation exercises which are easy to perform. The patient is instructed to rapidly change the position of head and recline to the affected side and maintain the position for 20-30 second or until the symptoms resolve. The subject is then made to sit again for 30 seconds. Then the subject is again asked to rapidly change position to the other side and maintain that position for 20-30 seconds or until the symptoms resolve and then again he/she is made to sit. This is the completion of one cycle of Brandt-Daroff exercise.\textsuperscript{[4]}

In India, the prevalence of hearing impairment has increased over the years. According to the 47\textsuperscript{th} Round of National Sample Survey Organization (NSSO) taken in 1991, 32,42,000 subjects over the age of 5 had a hearing disability, which means 1 in 1000 live birth which is defined as a hearing impairment of 60 decibels and above in the better ear to total loss of hearing in both ears.\textsuperscript{[5]} A study done in 2013, states that 88\% of the hearing impaired children suffer from vestibular dysfunction.\textsuperscript{[6]}

Since, there has been a high prevalence of vestibular dysfunction in hearing impaired children; there is also a need to manage vestibular dysfunction by using vestibular rehabilitation. Gaze Stability exercises and Brandt-Daroff exercises are two different types of exercises used for vestibular rehabilitation. This study is an attempt to compare the effects of Gaze Stability exercises and Brandt-Daroff exercises for vestibular dysfunction in hearing impaired children.
The main aim of the study was to compare the effect of gaze stability exercises and Brandt-Daroff exercises for balance in hearing impaired children with vestibular dysfunction. The objectives of the study were, firstly, to study the effect of gaze stability exercises for balance in hearing impaired children with vestibular dysfunction. Secondly, to study the effect of Brandt-Daroff exercises for balance in hearing impaired children with vestibular dysfunction. Thirdly, to compare the effect of gaze stability exercises and Brandt-Daroff exercises for balance in hearing impaired children with vestibular dysfunction.

MATERIALS AND METHODOLGY

An ethical committee approval was taken from Dr. D.Y. Patil College of Physiotherapy, Pune. Ethical committee review ID was DPU/ R & R(P)/ 336 (21)/17. All children fulfilling the inclusion criteria were taken into the study. An informed consent form was taken from the concerned child’s parent. The children were assessed for vestibular dysfunction. Children with hearing impairment of both genders, those diagnosed with vestibular dysfunction by ear nose and throat specialist, age between 10 to 17 years and any two of the following tests positive (Dix Hall Pike test, Supine Roll’s test, Fukuda Stepping Test and Sharpened Romberg’s test) were included in the study. Children receiving some other form of treatment for vestibular dysfunction, suffering from other systemic disorders, low intelligent quotient (less than 70), musculoskeletal disorders like fractures, strains, sprains leading to imbalance, central or peripheral neurologic diseases leading to disturbed balance and those who were handicapped were excluded from the study. The study took place at Indian Red Cross Society, Pune between March to October, 2017.

The children were screened by using Dix Hall Pike test, Supine Roll’s test, Fukuda Stepping Test and Sharpened Romberg’s test. The Dix Hall Pike test consists of a series of head movements conducted so as to stimulate the movement of the debris within the posterior semicircular canal. The test started with the child in the sitting position with the head turned in 45 degree towards the side to be tested. The assessor then assists them to lie down quickly and extend the neck 20 degree over to the end of the plinth, maintaining 45 degree rotation. The assessor should be able to see the child’s eyes and see for nystagmus. A positive response is noted if nystagmus is present. The test was repeated for the other ear.\[1,7,8\]

The child was in supine. The child’s neck was flexed and then rotated to the side in the plane of horizontal SCC. The therapist observes the child’s eyes for nystagmus. The elicited
nystagmus is horizontal and may also have a torsional component. The test was repeated for the other ear.\textsuperscript{[8]}

In the Fukuda step test, the child had to close his/her eyes and take about 50 steps in the same spot by marching on the same spot. The examiner stood directly behind the child throughout the test. The child’s head was then rotated by the examiner for 10–15 sec at a frequency of 3–4 Hz. If the direction of the stepping changes, then the test was positive for vestibular dysfunction.\textsuperscript{[9]}

In the Sharpened Romberg’s test, the child stands in heel to toe touch position with eyes closed for 10 seconds. If the child sways and is not able to maintain balance, the test was positive for vestibular dysfunction.\textsuperscript{[10]}

Those subjects who fulfilled the eligibility criteria were divided into two groups using simple random sampling by using the coin toss method. Group A received the Gaze Stability exercises and Group B received the Brandt-Daroff exercises. On coin toss, the subjects getting ‘Heads’ were put in group A and those with ‘Tails’ were put in Group B. Pediatric balance scale was used as an outcome measure to assess balance in hearing impaired children with vestibular dysfunction. The pre treatment assessment of balance was taken using the Pediatric Balance scale.

Group A received gaze stability exercises which were vestibular adaptation and substitution exercises designed to improve gaze stability. These adaptation exercises required the child to fixate on a visual target during either horizontal or vertical head movement. The substitution exercises required the child to perform eye-head movements between targets with the goal of seeing clearly during those tasks.\textsuperscript{[11]} Total time for eye movement exercises did not exceed more than 10 minutes per day. The distance for viewing near targets was 40 cms whereas the distance for viewing distant targets was 200 cms.\textsuperscript{[11,12]} As shown in Figure 1.

Table 1: illustrates the treatment program for Group A- Gaze Stability Exercises.

<table>
<thead>
<tr>
<th>Days</th>
<th>Gaze Stability Exercises Program</th>
<th>Total time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Horizontal and vertical x1 viewing exercise with near target, 1 minute duration, sitting</td>
<td>2 min</td>
</tr>
<tr>
<td>2</td>
<td>Horizontal and vertical x1 viewing exercise with near target, 2 minute duration, sitting</td>
<td>4 min</td>
</tr>
<tr>
<td>3,4</td>
<td>Horizontal and vertical x1 viewing exercise with near and far targets, 2</td>
<td>8 min</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Exercise Details</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,6 Horizontal and vertical x1 viewing exercise with near and far targets, and targets located in front of a busy background, 2 minute duration, standing</td>
<td>10 min</td>
</tr>
<tr>
<td>7,8 Horizontal and vertical x1 viewing exercise with near and far targets, and targets located in front of a busy background. Horizontal and vertical x2 viewing exercise, plain background. All exercises 1 minute duration, standing</td>
<td>10 min</td>
</tr>
<tr>
<td>9,10 Horizontal and vertical x1 viewing exercise with near and far targets, and targets located in front of a busy background. Horizontal and vertical x2 viewing exercise, busy background. All exercises 1 minute duration, standing</td>
<td>10 min</td>
</tr>
</tbody>
</table>

Screening for Vestibular Dysfunction using Dix Hall Pike test, Supine Roll’s test, Fukuda Stepping test and Sharpened Romberg’s test (n=65)

Subjects positive for vestibular dysfunction were selected and ethical consent was taken (n=31)

Pre – outcome measure assessment using Pediatric Balance Scale (n=31,)

Simple Random Sampling into 2 groups

Gaze Stability Exercises (n=15) | Brandt-Daroff Exercises (n=16)

Post outcome measure assessment using Motion Sensitivity Quotient and Pediatric Balance Scale (n=31)

Data was collect and analyzed

Group B received Brandt-Daroff exercises which were habituation exercises. It was performed by rapidly changing the position of head and reclining to the affected side and maintained for 20-30 second or until the symptoms resolve. The child was then made to sit
again. The child was then asked to rapidly change his position to the other side and maintaining that position for 20-30 seconds or until the symptoms resolve. Then, the child was made to sit again. This is the completion of one cycle of Brandt-Daroff exercise. Three to five cycles constitutes one set or session.\textsuperscript{[1,8]} The total treatment time did not exceed 10 minutes. As shown in Figure 2.

**Termination criteria**
Increased dizziness or discomfort, persistence of symptoms after a set.

**Precautions**
Adequate rest was provided between exercises, the child was supported during exercises including in eyes closed condition to prevent risk of fall if needed, entire set of exercises was performed under guidance of therapist.

**Safety**
If symptoms exacerbated, immediately the treatment was stopped. The child was supported into the supine lying position. The child was given plenty of water to drink. Proper rest was given to the child. The child was asked to stand up slowly as it may help alleviate dizziness associated due to positional change. An anxious child was felt reassured by the therapist. The treatment area was made self for a chronically dizzy patient. On standby, an emergency help was ready to be provided to the child. No adverse events occurred due to the vestibular rehabilitation treatment given during the 10 day protocol.

The Pediatric Balance scale was used for post treatment outcome assessments. There were no dropouts from the study. The data was collected and results were analyzed. The subjects and the statistician were blinded.
RESULTS

The data collected was analyzed using the Primer of Biostatistics, Version 7, 2011. The paired ‘t’ and unpaired ‘t’ tests were used within and in between groups for analysis.

Table 2: shows the pre and post scores of Pediatric Balance Scale(PBS).

<table>
<thead>
<tr>
<th>PBS</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>45.13</td>
<td>52.33</td>
</tr>
<tr>
<td>Group B</td>
<td>45</td>
<td>52.19</td>
</tr>
</tbody>
</table>
Graph 1: shows the pre and post scores of Pediatric Balance Scale (PBS).

Table 2 and Graph 1 demonstrates the pre and post data analysis for both groups using the unpaired ‘t’ test for using the Pediatric Balance Scale (PBS).

Table 3: shows the pre and post scores of Pediatric Balance scale (PBS) for both the groups.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>45.13</td>
<td>45</td>
</tr>
<tr>
<td>Post</td>
<td>52.33</td>
<td>52.19</td>
</tr>
</tbody>
</table>

Graph 2: shows for both the groups the pre and post scores of PBS.

Table 3 and Graph 2 demonstrates the pre and post data analysis for each group using the paired ‘t’ test for using the Pediatric Balance Scale (PBS).
Table 4: Demonstrates the Pre and Post values of Pediatric Balance Scale (PBS) for each component for Group A.

<table>
<thead>
<tr>
<th>Component No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>4</td>
<td>4</td>
<td>3.6</td>
<td>3.5</td>
<td>4</td>
<td>3.1</td>
<td>2.9</td>
<td>2.1</td>
<td>2</td>
<td>2.9</td>
<td>3.2</td>
<td>4</td>
<td>3.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Post</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3.9</td>
<td>4</td>
<td>3.8</td>
<td>3.7</td>
<td>3.1</td>
<td>3.1</td>
<td>3.7</td>
<td>3.9</td>
<td>3.9</td>
<td>3.7</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Graph 3: Illustrates the pre and post values of Pediatric Balance Scale for Group A.

Group A

Table 4 and Graph 3 shows the component wise changes in values of Pediatric Balance Scale in Group A- Gaze Stability Exercises.

Component 1, 2 and 5 are scored maximum i.e. a score of 4 for all subjects in the pre as well as post values of PBS in Group A.

Component 3 improved from 3.6 in the pre reading to 4 on the post reading.
Component 4 improved from 3.5 in the pre reading to 3.9 on the post reading.
Component 6 improved from 3.1 in the pre reading to 3.8 on the post reading.
Component 7 improved from 2.9 in the pre reading to 3.7 on the post reading.
Component 8 improved from 2.1 in the pre reading to 3.1 on the post reading.
Component 9 improved from 2 in the pre reading to 3.1 on the post reading.
Component 10 improved from 2.9 in the pre reading to 3.7 on the post reading.
Component 11 improved from 3.2 in the pre reading to 3.9 on the post reading.
Component 12 worsened marginally from in the pre reading 4 to 3.9 on the post reading.
Component 13 improved from 3.1 in the pre reading to 3.7 on the post reading.
Component 14 improved from 2.9 in the pre reading to 3.6 on the post reading.
Table 5: Demonstrates the Pre and Post values of Pediatric Balance Scale (PBS) for each component for Group B.

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>4</td>
<td>4</td>
<td>3.6</td>
<td>3.4</td>
<td>3.9</td>
<td>3.1</td>
<td>3</td>
<td>2.5</td>
<td>1.9</td>
<td>3.1</td>
<td>3.3</td>
<td>4</td>
<td>2.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Post</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3.6</td>
<td>3.6</td>
<td>3.3</td>
<td>2.9</td>
<td>3.8</td>
<td>4</td>
<td>4</td>
<td>3.6</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Graph 4: Illustrates the pre and post values of Pediatric Balance Scale for Group B.

Group B
Table 5 and Graph 4 demonstrates the component wise values of Pediatric Balance Scale for Group B.

Component 1, 2 and 12 are scored maximum i.e. a score of 4 for all subjects in the pre as well as post values of PBS in Group A.

Component 3 improved from 3.6 in the pre reading to 4 on the post reading.
Component 4 improved from 3.4 in the pre reading to 4 on the post reading.
Component 5 improved from 3.9 in the pre reading to 4 on the post reading.
Component 6 improved from 3.1 in the pre reading to 3.6 on the post reading.
Component 7 improved from 3 in the pre reading to 3.6 on the post reading.
Component 8 improved from 2.5 in the pre reading to 3.3 on the post reading.
Component 9 improved from 1.9 in the pre reading to 2.9 on the post reading.
Component 10 improved from 3.1 in the pre reading to 3.8 on the post reading.
Component 11 improved from 3.3 in the pre reading to 4 on the post reading.
Component 13 improved from 2.8 in the pre reading to 3.6 on the post reading.
Component 14 improved from 2.5 in the pre reading to 3.4 on the post reading.
Table 6: Demonstrates the component wise difference between the Pre and Post values of Pediatric Balance Scale (PBS) for each component for both the groups.

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>0</td>
<td>0</td>
<td>0.4</td>
<td>0.4</td>
<td>0</td>
<td>0.7</td>
<td>0.8</td>
<td>1</td>
<td>1.1</td>
<td>0.8</td>
<td>0.7</td>
<td>-0.1</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Post</td>
<td>0</td>
<td>0</td>
<td>0.4</td>
<td>0.6</td>
<td>0.1</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>0.7</td>
<td>0.7</td>
<td>0</td>
<td>0.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Graph 5: Demonstrates the component wise value of the difference between the pre and post values of Pediatric Balance Scale for each group.

Table 5 and Graph 5 demonstrates the difference between Pre and Post values of Pediatric Balance Scale for both the groups.

Component 1 and 2 has a difference of 0 for both groups.
Component 3 has a difference of 0.4 for both the groups.
Component 4 has a difference of 0.4 for Group A and 0.6 for Group B.
Component 5 has a difference of 0 for Group A and 0.1 for Group B.
Component 6 has a difference of 0.7 for Group A and 0.5 for Group B.
Component 7 has a difference of 0.8 for Group A and 0.6 for Group B.
Component 8 has a difference of 1 for Group A and 0.8 for Group B.
Component 9 has a difference of 1 for Group A and 1.1 for Group B.
Component 10 has a difference of 0.8 for Group A and 0.7 for Group B.
Component 11 has a difference of 0.7 for both the groups.
Component 12 has a difference of – 0.1 for Group A and 0 for Group B.
Component 13 has a difference of 0.6 for Group A and 0.8 for Group B.
Component 14 has a difference of 0.7 for Group A and 0.9 for Group B.

DISCUSSION
In our study 65 children were assessed for vestibular dysfunction. 3 children were excluded as 1 was suffering from mental retardation, 1 from night blindness and 2 suffered from vision problems. From the remaining 62 children, 31 children suffered from vestibular dysfunction. Vestibular dysfunction was prevalent in hearing impaired children in the population studied. From the study population 50% of the children suffered from vestibular dysfunction. This could mainly be due to involvement of the eighth cranial nerve as it is a common pathway for vestibular and hearing impulses. Similarly, Jerome A. et al in a study in 2013 found that 88% of the hearing impaired children screened suffered from vestibular dysfunction. [4]

Our study showed almost equal improvement in balance in vestibular dysfunction in hearing impaired children on assessment with the Pediatric Balance Scale. The Gaze Stability exercises group fared just slightly better than the Brandt- Daroff exercises group on balance assessment in the Pediatric Balance Scale.

The improvement in the group receiving Gaze Stability exercises might be due to adaptation of the vestibular system. This adaptation might result into the resolution of the sensory mismatch between vestibular, visual and somatosensory inputs. The improvement in the Brandt- Daroff exercises group might be due to central adaptation occurs reducing the nervous system responses to the signal from the posterior canal. It can also occur due to dissolution of the debris into the endolymph. It may also occur due to dislodgment of the debris from the cupula of the posterior semicircular canals and moves to a location that no longer affects the cupula during head movements. The improvement with gaze stability exercises were more could be mainly due to vestibular and visual stimulation while Brandt- Daroff exercises only provided vestibular stimulus.

Similarly, Bhardwaj V. and Vats M. in 2014 studied the effect of Gaze Stability exercises in healthy elderly population. They also found improvement in balance and reduction of the psychological impact of balance impairment in healthy elderly population.[11] Also, Singh S. and Khanna T. in 2014 also studied the effects of Gaze Stability exercises on balance in the elderly.[12] in another study Pimenta C., Correia A, Alves M., et al in 2017 studied the effects of Gaze Stability exercises on balance after stroke which showed improvement on postural stability and balance.[13] Also, Clendaniel R. in 2010 studied the effects of Gaze Stability exercises on balance and gait in unilateral vestibular hypofunction. The study showed similar findings as to our study in improvement in balance.[14]
Similarly, Divya S. et al in 2016 studied the effect of Brandt-Daroff exercises in Benign Paroxysmal Positional Vertigo. They found significant improvement in balance function. Tee L. and Chee N. in a study in 2005 mentioned that Brandt-Daroff exercises help in improving balance in vestibular dysfunction.[15]

Herdman S. in 2000 in its book explained about the beneficial effects of Gaze Stability exercises and Brandt-Daroff exercises for balance impairment in vestibular dysfunction patients. They also mentioned about the effects of Vestibular Rehabilitation Therapy on balance deficits in vestibular dysfunction.[2]

**CONCLUSION**

Our study concludes that vestibular rehabilitation has a positive effect for improving balance in vestibular dysfunction. Gaze stability exercises and Brandt–Daroff exercises both had a positive prognostic outcome for vestibular dysfunction in hearing impaired children. However, Gaze stability exercises had a clinically slightly better outcome than Brandt-Daroff exercises.

**REFERENCES**