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Efficacy of vestibular rehabilitation program in children with balance disorders and sensorineural hearing loss

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Abstract

Objective

Asses the efficacy of a Vestibular-balance rehabilitation program to minimize or reverse balance disability in children with sensorineural hearing loss.

Method

Forty-five hearing-impaired children with balance deficits (i.e., variable degrees of sensorineural hearing loss or auditory neuropathy). Thirty-five were rehabilitated with cochlear implants, and ten with hearing aids. Their age ranged from 4 to 10 years old. A Pre-rehab evaluation was done using questionnaires, neuromuscular evaluation, vestibular and balance office testing, and vestibular lab testing (using cVEMP and caloric

test). Customized balances, as well as vestibular rehabilitation exercises, have been applied for three months. That was followed by post-rehab assessment, including the Arabic DHI questionnaire, PBS, BESS, HTT, and DVA test.

Results

There was a statistically significant difference in all measured parameters (including the Arabic DHI questionnaire, PBS, BESS, HTT, and DVA test) after rehabilitation.

Conclusions

Vestibular-balance rehabilitation intervention positively impacts vestibular and balance functions in hearing-impaired children.

Introduction

Since the cochlea and vestibular end organs share the continuous membranous labyrinth of the inner ear, they are anatomically and functionally related regarding innervation and vascular supply [1].It has been reported that disorders in balance static [2], dynamic, slower gait speed [3], and postural control instability [4], all these abnormalities have been reported evidently in children with sensorineural hearing loss than their normal-hearing peers [5]. Additionally, several studies have found that children with congenital or early-onset vestibular deficit had impaired gross motor development, i.e., delayed acquisition of head control, sitting and/or walking unsupported [6].

These vestibular and balance deficits in hearing-impaired children negatively impact their daily life activities, leading to emotional embarrassment and social isolation [1].

Accordingly, there is an increased interest in developing vestibular-balance rehabilitation program for children with balance disorders and sensorineural hearing loss [7].

Section snippets

Method

- Research design: Interventional longitudinal study.…
- Ethical considerations: The Research Ethics Committee approved the study. The Research Ethics Committee's approval date was August 29, 2021 (FMASU MD 154/2021).…

…

Data analysis

The collected data was revised, coded, tabulated, and introduced to a PC using Statistical Package for Social Science (SPSS 15.0 for Windows; SPSS Inc, Chicago, IL, 2001). Data was presented, and suitable analysis was done according to the type of data obtained for each parameter. Descriptive statistics included: mean, median, standard deviation (±SD), minimum and maximum values (range) for numerical data, and frequency and percentage of non-numerical data. Analytical statistics: The normality…

Demographic data

Heredofamilial hearing loss (i.e. positive family history of consanguinity) was the most common cause of hearing loss (Fig. 2).…

Pre-rehabilitation evaluation

Most of the study group (68.9%) had normal muscle tone, power, and deep tendon reflexes. VOR assesment of the study group (Fig. 3), where none of the children with intact bilateral VOR had abnormal VORS.…

Comparison between pre. And post-rehabilitation

4.3.1 Children with positive DHI questionnaire (questions scores).…

4.3.2 VSR and postural control tests (PBS and BESS).…

4.3.3 VOR assessment tests (HTT and DVA) were used in the CI group…

…

Discussion

The main objective of this study was to examine the effectiveness of vestibular and balance rehabilitation on postural control, static, dynamic balance, and health-related quality of life in hearing-impaired children. The main finding of this study is that following twelve weeks of a vestibular-balance training program, the children with hearing impairment improved in all measured parameters.

67% of the study group had positive family history of consanguinity (Fig. 2). This is consistent with …

Conclusion

Effective vestibular-balance rehabilitation therapy in hearing-impaired children with balance deficits improves postural stability, static, dynamic balance, and vestibular functions.…

Limitations

1) Pre-rehabilitation assessment was done in 2–3 sessions, especially in young children from 4 to 6 years old.…

2) The DVA test was difficult to conduct in children under six years old.…

3) Difficulty of communication with hearing-impaired children.…

4) Frequent dropouts during primary evaluation, rehab, and even after rehab (since it is hard to keep committed to the whole rehabilitation program) because of the financial burdens and time needed for the sessions.…

5) The Families' awareness regarding their children's…

…

Informed consent

Informed consent was obtained from the parents of participants included in the study.…

CRediT authorship contribution statement

Somaia Tawfik Mohamed: Supervision, Conceptualization, Writing – review & editing. **Nagwa Hazzaa:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Tayseer Abdel Rahman:** Writing – review & editing, Supervision, Methodology, Data curation. **Dalia Mohamed Ezz Eldin:** Methodology. **Aya Magdy Elhusseiny:** Writing – original draft, Methodology, Formal analysis, Data curation.…

Declaration of competing interest

All authors declare that they have no competing interests regarding this research.…

Recommended articles

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