



ORIGINAL ARTICLE

**Postural control assessment in students with normal hearing and sensorineural hearing loss<sup>☆,☆☆</sup>**



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**KEYWORDS**

Motor skills;  
Vestibular diseases;  
Psychomotor  
performance;  
Posture;  
Deafness

**Abstract**

*Introduction:* Children with sensorineural hearing loss can present with instabilities in postural control, possibly as a consequence of hypoactivity of their vestibular system due to internal ear injury.

*Objective:* To assess postural control stability in students with normal hearing (i.e., listeners) and with sensorineural hearing loss, and to compare data between groups, considering gender and age.

*Methods:* This cross-sectional study evaluated the postural control of 96 students, 48 listeners and 48 with sensorineural hearing loss, aged between 7 and 18 years, of both genders, through the Balance Error Scoring Systems scale. This tool assesses postural control in two sensory conditions: stable surface and unstable surface. For statistical data analysis between groups, the Wilcoxon test for paired samples was used.

*Results:* Students with hearing loss showed more instability in postural control than those with normal hearing, with significant differences between groups (stable surface, unstable surface) ( $p < 0.001$ ).

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**PALAVRAS-CHAVE**

Destreza motora;  
Doenças vestibulares;  
Desempenho  
psicomotor;  
Postura;  
Surdez

*Conclusions:* Students with sensorineural hearing loss showed greater instability in the postural control compared to normal hearing students of the same gender and age.

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### **Avaliação do controle postural em escolares ouvintes e com perda auditiva sensorineural**

**Resumo**

*Introdução:* Crianças com perda auditiva sensorineural podem apresentar instabilidades posturais, possivelmente provocadas pelo acometimento do sistema vestibular em virtude da lesão na orelha interna.

*Objetivos:* Avaliar a estabilidade do controle postural em escolares ouvintes e com perda auditiva sensorineural e comparar os dados entre os grupos, considerando os gêneros e as faixas etárias.

*Método:* Estudo de corte transversal, que avaliou 96 escolares de ambos os gêneros na faixa etária entre 7-18 anos, sendo 48 ouvintes e 48 com perda auditiva sensorineural. A avaliação do controle postural foi realizada por meio da Escala de BESS (*Balance Error Scoring System*) que avalia o controle postural em duas condições sensoriais: superfície estável (SE) e superfície instável (SI). Para a análise estatística dos dados entre os grupos, foi utilizado o teste de Wilcoxon de comparação de médias para amostras pareadas.

*Resultados:* Os escolares com perda auditiva demonstraram maior instabilidade no controle postural que os ouvintes, apontando diferenças significativas entre os grupos na SE e SI ( $P < 0,001$ ).

*Conclusão:* Os escolares com perda auditiva sensorineural demonstraram maior instabilidade no controle postural, em comparação com os escolares ouvintes do mesmo gênero e faixa etária.

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**Introduction**

In the first years of life, children develop a vast repertoire of motor skills such as dragging, crawling, walking, and eventually running; however, in order to develop all these motor skills, an improvement of postural control is required.<sup>1</sup> Around 12 months of age, the child learns how to stay in a standing position, acquires the ability to stay in this position without any help or support and, thus, can further explore the environment around it, making the achievement of the postural control a milestone in any child's mental development.<sup>2</sup>

Postural control has been described as the ability of the individual to remain comfortably in a standing position, keeping his/her body posture stable and aligned, even when suffering disruptions stemming from the external environment.<sup>3</sup> For a satisfactory postural control, is necessary that those sensory systems responsible for its regulation present a seamless integration and regulation.<sup>4</sup>

The main sensory sources responsible for the regulation of postural control are the visual, somatosensory, and vestibular systems.<sup>5</sup> The contribution of each of these to the regulation of postural control occurs selectively, when the central nervous system increases the activity of a system that will prove most useful at the time, reducing the activity of the others, for the regulation and/or maintenance of

body posture in a particular task or posture.<sup>6,7</sup> If there is any change in any of these sensory systems, the regulation dynamics of postural control can appear uncoordinated and consequently impaired.<sup>8,9</sup>

Due to the anatomical proximity of the structures responsible for auditory and vestibular functions, it is common to find associated changes in both systems, in the case of involvement of the inner ear. Thus, it is reasonable to assume that children with sensorineural hearing loss also demonstrate vestibular disorders.<sup>10</sup> Furthermore, studies have shown that the hypoactivity of the vestibular system is a frequent finding in otoneurologic evaluations of children with sensorineural-type hearing loss.<sup>11-13</sup>

Children with sensorineural hearing loss appear to show sensory changes from the vestibular system, probably due to inner ear damage. Because the vestibular system is one of the sensory systems responsible for regulating the postural control, these children may present instabilities in the regulation of this control, or this regulation may be uncoordinated,<sup>14</sup> when compared to listeners. Based on the above considerations, the aim of this study was to assess the postural control of normal hearing students and their counterparts with sensorineural hearing loss and compare data among groups, considering gender and age group in the sample and the degree of hearing loss in students with hearing impairment.

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