

Critical Review:

In preschool aged children (0-3years), is there evidence of noise induced hearing loss related to the use of battery-operated age-appropriate toys?

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This critical review examined the effects noise levels emitted from preschool age-appropriate toys had on producing noise induced hearing loss in preschool aged children (0-3years). Overall, research indicates that current preschool aged toys emit noise levels that exceed current regulations and are within a range that may lead to noise induced hearing loss in adults. Research also indicates that children are playing with toys closer to their ears than the distance used in safety regulations. A concrete statement regarding the effect of current preschool aged toys causing noise induced hearing loss in children cannot be made at this time due to absence of research directed to the question.

Introduction

Concerns have been raised regarding current preschool aged toys on the market creating noise induced hearing loss (NIHL) in children.

In order to evaluate NIHL, the intensity of a given noise needs to be assessed in combination with the duration of exposure.

Studies have shown that 10% of cases of children with hearing loss are attributed to noise (Luxon, 1998). Research found that 85% of the toys are

Results

Descriptive Designs

Two studies were undertaken to determine the current risk of NIHL from toys currently on the market (Yaremchuk, Dickson, Burk, & Shivapuja, 1997; Larocque, 2004).

Yaremchuk, et. al, (1997) purchased 25 preschool age-appropriate toys at a national toy chain and sound levels were measured at distances approximating ear level (2.5cm) and a child's arm length (25cm) from the surface of the toy. Tests revealed peak sound levels ranging from 81 to 126 dB(A) at 2.5 cm and 80 to 115dB(A) at 25 cm from the surface of the toy. Yaremchuk et. al (1997) used The National Bureau of Standards (NBS) to assess

association between an existing hearing loss and prior exposure. However, because of the retrospective approach the determination of a causal relationship could not be made.

One hundred and fourteen of 2284 consecutive patients, aged 19.9 years and younger, diagnosed as having sensorineural hearing impairment at the Boys Town National Research Hospital were classified as having probable NIHL. The population of children from which the sample was drawn is typical of those referred to a large pediatric otolaryngology/audiology clinic and do not represent a random sample of the general pediatric population. Although the population is not generalizable, drawing from a convenience population may be the first step before the researchers are able to obtain funding to open the study to the general population.

A case history was completed to exclude those from the study who had familial hearing loss, prenatal infections, stressful delivery or NICU admission, mumps, head trauma requiring medical evaluation with or without loss of consciousness, meningitis, recurrent otitis media, or treatment with ototoxic drugs. Even though some of the excluded children had histories of noise exposure they were not included in the study because of the aforementioned potential confounding variables.

The questionnaire used was not standardized or piloted, which decreased reliability and validity. The way in which the case history was obtained is unknown, and no statistical analysis was mentioned. Given the lack of generalizability, the study provides some evidence of association between hearing loss and noise exposure in youth, in a limited capacity.

Recommendations for Clinical Practice

The aforementioned research indicates that noise levels emitted from currently available toys are intense enough to cause damage to the auditory system in children. However, NIHL is a combination of both intensity of noise and the duration of exposure. Therefore, knowing only the intensity of the toys is insufficient as a predictor of the hearing hazard. Without knowledge of exposure and typical use durations, it would be advisable for clinicians to warn parents against the potential danger in preschool aged-appropriate toys. However, it must be stated that the existing research is methodologically limited and therefore, a concrete statement regarding specific effects and guidelines for current toys should not be made at this time. Further research possibilities are limited due to ethical restrictions and the limited

sensitivity of audiometric testing. Current clinical tests are unable to reveal the beginning stages of inner hair cell damage and therefore, a direct correlation between use of preschool age-appropriate toys and NIHL is difficult to establish.

References

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