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# Pseudohypacusis in children: Circumstances and diagnostic strategy

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ABSTRACT

*Objectives:* The study attempts to specify the circumstances under which we should pay attention to children's pseudohypacusis. It evaluates the methods used to detect such cases and to determine hearing thresholds, according to the uni-or bilateralism of hearing loss. The study finally deals with the future of children diagnosed with pseudohypacusis.
*Methods:* The study was retrospective from January 1993 to November 2011 and prospective from December 2011 to April 2012. We included all the children between 3 and 16 years who were diagnosed with pseudohypacusis. We observed the reasons for them to consult, whether they had already been tested or had treatment, and what kind of hearing loss they displayed. All children were tested using standard pure tone audiometry and speech audiometry. Depending on the first results, other tests were conducted. They included transient evoked otoacoustic emissions (TEOEs), auditory brainstem responses (ABR) and auditory steady state responses. Families were finally contacted by phone over April 2012 in order to let them know about their child's results.
*Results:* Fifty-four children were included: 19 boys and 35 girls, with an average age of 10 year-old (±3). The simulated hearing loss (HL) was bilateral (36), unilateral (18), of perception (37), moderate HL (33), cophosis (5). Fifteen cases were linked to a family or personal history of hearing loss, while 27 cases were due to important events like adoption, abuse, verbal aggression, school problems. Before diagnosing a pseudohypacusis, 13 children had had imaging studies, 3 had been treated with corticosteroids, and 5 had hearing aids. Most of the time the presence of pseudohypacusis was suspected a discrepancy between speech reception and air-conduction pure tone thresholds, as shown by the medical test (answer on whispered voice). The diagnosis was confirmed by ABR or TEOEs, except in cases where clinic was obvious. Then family's patient and patient were reassured and informed. An audiological follow-up during either 6 months or 1 year was proposed, as well as a psychological consultation.
*Conclusion:* Complementary examinations have to be performed to rule out a pseudohypacusis case before suggesting an invasive or expensive treatment (surgery or hearing aids) of children.


## 1. Introduction

Pseudohypacusis – also known as non-organic hearing loss (NOHL) – is defined as a discrepancy between the actual hearing thresholds of the patient and the admitted one. The word does not refer to the intentions, conscious or subconscious, of the patient who has been tested. Other words are used to describe it. They picture pseudohypacusis as malingering, functional hearing loss, psychogenic hearing loss, feigning deafness, pseudohypacusis and conversion deafness. NOHL is the most neutral word to describe the situation.

Since 1946, Doerfler and Stewart have started a discussion about the subclassifications of NOHL. The Austen and Lynch model makes use of three key diagnostic categories from DSM-IV linked by a continuum based on intent and gain. The first diagnosis is malingering. It refers to the intentional production of false – or grossly – exaggerated physical symptoms for self-gain (financial gain and drugs in order to avoid military service) [1,2]. The second diagnosis is factitious disorder, which states that the gain is intra-psychic rather than external. It refers to intentional production – or feigning of physical symptoms – when the motivation behind the behavior consists in assuming a sick role [1]. Finally, the third

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diagnosis stresses the fact that the patient unintentionally products symptoms in conversion disorder. Conflict or others stresses tend to precede the psychological change [1,3].

Pseudohypacusis also affects children [4–6]. In such cases, they are generally easier to diagnose than adults since children reproduce less consistently. However children's diagnosis is often missed because of a lack of awareness regarding the possibility of the disease affecting them [7]. Each time a child displays poor tone thresholds, the examiner must verify that they are not the consequence of a misunderstanding or an unfamiliarity with the test procedure, or attention disorders. Children may have difficulty in paying attention to abstract stimuli such as tones. A simple method to improve the results in case an unfamiliarity occurs with the test procedure consists in repeating the test several times. Unfortunately, this is a time consuming process.

The organicity of the hearing loss must be verified before any invasive examination or treatment take place. If the hearing loss is diagnosed as non-organic, the real hearing level must be evaluated.

The aim of our study is to precise the circumstances under which we must pay attention to a pseudohypacusis case, as well as to evaluate the methods used to detect its presence in children and to determine their real hearing thresholds. It finally aims at analyzing the possible outcomes for these children.

## 2. Methods

The study concerned children from 3 to 16 year-old diagnosed with pseudohypacusis. This study was retrospective from January 1993 to November 2011 and prospective from December 2011 to April 2012. Mentally retarded children were not included in the study.

A detailed history of language retardation, school difficulties, behavioral disorders, ear trauma, and family difficulties (for instance parents' separation) was obtained.

Furthermore, the purpose of children diagnosed with pseudohypacusis' visit, the record of prior visits to our hospital or to another one for the same reason, as well as prior audiometric tests or treatments were recorded. The type and number of previous "false" or "faked" audiological evaluations was also taken into account.

Every child had to go through an audiological evaluation in a sound treated booth. Tests were conducted with a Conera clinical audiometer (GN Otometrics, Denmark) for pure tone and speech audiometry through standard earphones. The hearing level was considered as being normal if the air-conduction threshold was better than 20 dB in the four speech frequencies 0.5, 1, 2 and 4 kHz. The speech stimuli were based on the Boorsma lists of words for children, and delivered by the Digivox program (Audivimedia, Paris, France) through a PC computer connected to the audiometer. Speech audiometry was considered as being normal when speech reception threshold fall under 20 dB with a 100% discrimination score.

When judged necessary, tympanometry and acoustic reflex, transient evoked otoacoustic emissions (TEOE) and/or auditory brainstem responses (ABR) were recorded. We also used auditory steady state response (ASSR) for several cases in order to obtain objective responses on several frequencies. Tympanometry and acoustic reflex measurements were accomplished with an AZ7R impedance audiometer (Interacoustics, Assens, Denmark). TEOEs were recorded with the ILO92 Otodynamic analyzer measuring system (Otodynamics Ltd, London, England). The stimuli were not linear clicks, going from 69 to 85 dB SPL. TEOEs were identified on a global reproducibility greater than 75% and more than 3 dB of $S/N$ ratio in at least 3 frequency bands [8]. Auditory brain stem responses (ABR) and auditory steady-state responses (ASSR) were recorded on an Eclipse (Interacoustics, Assens, Denmark). For ABR recordings, the stimulus rate was 11 clicks/s, and 1600 clicks were presented for each stimulus level [9]. The disappearance of wave V while decreasing the intensity of the stimulus determined the threshold. For ASSR recordings, both ears were tested simultaneously on 4 frequencies (0.5, 1. 2, and 4 kHz), with a modulation frequency between 75 and 95 Hz.

The children were divided into two groups according to the uni- or bilateralism of the supposed hearing loss and also according to where these children stand on a graduation going from mild to moderate, severe, profound and complete (cophosis).

We contacted patient's families. They underwent a prewritten phone interview about the hearing of their child, the wear of hearing aids after diagnosis of pseudohypacusis and the need for another doctor's consultation. The reason and the duration of the simulation were also assessed. For those who consulted our psychologist we noted if he helped them and their child, if they thought it was important to see him and how he helped them.

## 3. Results

During this period of time, 54 children between 3 and 16 year-old were referred to our institution because of audiological assessment. They were diagnosed with pseudohypacusis [Fig. 1]. They were 35 girls and 19 boys, with an average age of 10 years (±3 months) (min: 4 years, max: 16 years).

From November 2011 to April 2012, 9 children out of 145 who had been tested for deafness were diagnosed with pseudohypacusis. The incidence of pseudohypacusis during the prospective part of the study was 6.2%.

### 3.1. Past history of the children diagnosed with pseudohypacusis

In 27 cases – half of our patients –, important events happened in the child's life. Prior to their hearing loss complaint, two children had experienced a physical aggression, ten had difficulties at school, one had a family drama–the brutal death of one of his aunt, and one was examined within a context of abuse. Three children were experiencing parents' separation. One child was raised in a foster family, while another one had leukemia. A girl suffered from anorexia and depression because of rheumatoid polyarthritis. Another girl had intense visceral pain. Four children had behavioral disorders (hyperactivity and aggressiveness), and two others thought of as having a bilateral hearing loss had language retardation.

In our study fifteen children displayed otological antecedents. Four children had a family history of perceptive deafness, among them one had a brother with a progressive deafness since 2011. One child had already suffered a sudden unilateral deafness. Another child had an external otitis one week before the allegated hearing loss, and four children had a serous otitis media, which was

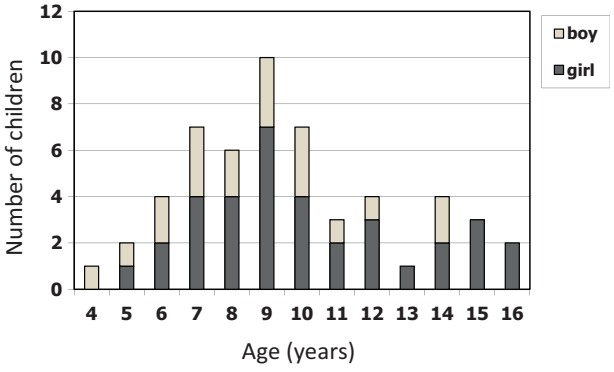


**Fig. 1.** Distribution of pseudohypacusis by gender and age.