

# EARLY DETECTION OF HEARING LOSS – A CONDITION FOR A GOOD RECOVERY OF THE DEAF CHILD

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**ABSTRACT.** The **hypothesis** of this study consists in demonstrating based on statistic data, if the patients' anxiety and the frequency of dysfunctional thoughts can be decreased with psychotherapeutic interventions and the observation of influences on arterial tension values as well as the influence on the C-reactive protein. **Methods:** The test specimen includes 89 patients with collagen illnesses associated with specific cardiovascular illnesses. The patients were recruited from the Internal Medicine department of the Emergency County Hospital Reșița, diagnosed with collagenosis (PR, SA, LED, DM, Sdr. Sjogren) associated with specific cardiovascular illnesses (HTA, FA, BRD, BRS, Angina pectorala, IM). Our test specimen included 33 patients with collagen illnesses and related cardiovascular illnesses that are exposed to psychological questionnaires (ATQ and HARS), coming from urban and also rural areas, with ages from 24 to 70, among which 15 are males and 18 are females (fig. 1b). All the patients agreed to participate in this study and all of them gave their approval. The study and the application of evidence had in its vision obedience of the ethical norms and professional ontology. **Results:** the influence of psychic factors on collagen illnesses associated with cardiovascular illnesses. **Conclusions:** On the studied group it was observed that most of the people with collagen illnesses are also affected by cardiovascular diseases that, as a result from clinical and paraclinical tests, are estimated to be a risk factor for the studied patients and also through psychological interventions we can identify the neurotic patients' psychological pattern.

**Keywords:** psychic factors, cardiovascular illnesses, collagen illnesses, psychological questionnaires.

## INTRODUCTION

Is the most important, difficult and complex, and it requires human and material special efforts, a team work in which, each element has its well defined and decisive role at the same time. Early detection of hearing loss, and correction of hearing deficit is essential to start early, for a better development of language, cognitive, social, and general development of the child. Detection of hearing loss in children comprises two stages:

- screening stage - screening, selection
- clinical stage

### Screening stage

Is the stage of early detection of children with hearing impairment, the screening should be performed in the maternity hospital and it is ideal to carry out on all newborns, but for financial and human resources reasons, it is currently being carried out in Romania only in two maternity hospitals, and only on some cases - see the etiology.

### Acoustic otoemissions

Acoustic otoemissions, are noises that can be detected in the ear canal after mechanical stimulation of the ear, and are reflecting activity in the external hair cells, that can contract, that can be long or short, in response to various stimuli.

In the external auditory canal is inserted an airtight probe that has two channels: through one a sound stimulus is transmitted to the eardrum, ossicular chain, cochlea, and is received by the second, which is the

stimulus delivered by external ciliated cells, and mediated responses, are processed by computer which displays results on the screen.

In conclusion - OAE is a noninvasive and painless exam

- A brief examination
- No need for soundproof room
- Allows storage of data, to be compared later
- OAE shows that the inner ear is normal, and middle ear is normal, as the waves on their way to and from the external auditory canal are not encountering any obstacles.
- because hearing loss of 30-35 dB is considered to produce no OAE results, OAE detects hearing loss but is not measuring it.

### Early auditory evoked potentials (EAEP)

It is a process which measures electrical activity of the cerebral trunk occurred in response to electrical stimulation, using three electrodes – one on the vertex, one on the mastoid and one on the lobes of the ears.

Examination has advantages and disadvantages.

- advantages:
  - easy to perform and noninvasive
  - does not depend on the state of sleep or anesthesia
  - has maximum sensitivity in differentiating lesions of the cochlea or retrocochlear
- disadvantages: does not give information about cochlear function
- not a monoaural exam
- masking is required

- frequency-specificity is limited to high intensities

### Conclusions

There are still discussions about which of the two methods, OAE or EAEP, which one is better in terms of time, personnel involved, equipment, and precision.

OAE, is insensitive to neurological disorders

- is a cheaper and faster method
- transmission is affected by disturbances
- gives information about the inner ear and the environment when present.

PEAP-is affected in neurological diseases

- is less affected by disturbances like transmission
- assesses auditory pathways up to the level of the brainstem

It seems that a good screening would mean to use both methods, neither of which is perfect, the two methods complement each other, but mostly for financial reasons only one is most commonly used, that is the OAE. If the test is abnormal the screening goes to the next step, clinical stage.

### Clinical stage of hearing testing

It is a step that requires more complex equipment, performance, and a team with great experience and dedication.

This stage contains several review:

- ENT complete clinical examination
- objective methods of examination of hearing:
  - Impedancemetry
  - OAE
  - PEAP
  - ASSR

### ENT clinical examination

Includes a full examination of the child, especially otologic examination to evaluate the morpho-functional, external and middle-ear sound transmission, and if possible remedy pathological aspects: congenital stenosis, various atresias, vernix caseosa, or wax in the ear canal, otitis media of various kinds. The ENT clinical examination is very important, is the starting point for other audiological investigation and requires a specialist preferably with experience in child pathology.

### Audiometric evaluation of a child

It is a difficult examination, assessment of hearing in children requiring special conditions:

- appropriate environment, a quiet room, preferably soundproofed, general anesthesia possibilities, high-performance devices
- well trained personnel, with patience and understanding.

Early detection is crucial, as early undetected hearing loss will cause delay in language development, leading to a delay in mental development of the child.

Assessing includes several methods and they fall into three broad categories:

- behavioral methods
- reflex methods
- objective methods

### Behavioral methods

It is based on the observation of children, primarily the so-called auditory behavior of children, as in children with normal hearing, ear age equals the biological age, and the observation of behavior change following sound stimulation.

Testing will be done differently depending on the age of the child, because when the child is older than four months, it responds to lower intensity sounds than before.

There have developed numerous graphs of auditory skills development in children, and also many examination techniques that are different depending on the age of the child, the experience of the examiner.

Behavioral methods were first used in detecting hearing loss, and have long been known to have an important role, but declined in importance after developing objective methods.

### Reflex methods

It is based on observation and recording reflex responses to sound stimulation, they can produce motor reflexes (cochleo-eyelid, cochleo-stapedian) or neuro-vegetative changes, neuro-vegetative reflexes (change rhythm and amplitude of breath, cardiotahtimetry, electrodermal reflex or psycho-galvanic).

### Objective methods

Includes:

Impedansmetry

- Acoustic-OAE-otoemissions
- Auditory-potential -PEAP
- ASSER (audimetry steady state evoked response)

### Impedansmetry

It is an objective method of testing hearing, the acoustic impedance representing the opposition of, the resistance of a material environment makes, as sound waves are passing through: it depends on negligible factors (mass, friction) and important factors as stiffness, which is the essential element of acoustic impedance of the ear.

Middle ear impedance is a method that measures changes in air pressure in the ear canal, or triggers the stapedian reflex.

### Tympanometry

Gives information about the status of the middle ear, a probe is inserted tightly in the ear canal, and the device displays tympanogram curve, which can be printed and then interpreted

Stapedian acoustic reflex

It objectifies the occurrence of the decrease in compliance during a sound stimulation. In humans it is the only reflex triggered by sound stimulation. Acoustic reflex thresholds are located at 70-80dB over tonal thresholds.

Impedansmetry is a method with high percentage of success in the examination of the hearing of a child, some authors communicating up to 80% success in exam hearing in young children.

### OAE and PEAP

OAE - PEAP are two methods described as "screening" and are an essential step in the early

detection of hearing loss in children but unfortunately they are only screening methods, they can detect a hearing loss but they can not measure it.

If the middle ear is normal and OAE are present, the inner ear is normal.

If the middle ear is normal, the PRB are present but PEAP are absent -injury is central to the inner ear (external ciliate cells)

If the middle ear is normal, OAE absent and present PEAP, but raised threshold sensorineural hearing loss, the loss in hearing cochlear.

In conclusion in the clinical examination phase is better to use both methods because they complement each other.

#### Auditory Steady-State Response (ASSR)

It is a huge step forward in the exploration of hearing of the child, is an objective method for measuring the decrease of hearing. Is very important for therapeutic behavior: hearing aid or cochlear implant

ASSR is also an objective electrophysiological method in the same category with OAE and PEAP, the difference between them is the type of sound used, ASSR uses four tones simultaneously on both ears, modulated in amplitude and frequency, carrier frequency and individualized for each ear which are

## CONCLUSIONS

Early detection of hearing loss in children is a very important and very difficult and delicate at the same time, it is important, given its role in language development and then, the mental development of the child and it is difficult because it requires specialized equipment, which is very expensive, and high-specialized people, requiring great skill, hard work and last but not least, love for the children patients.

Early detection of hearing loss, correcting it, by hearing aids or cochlear implant, and then the work of rehabilitation of these children is very difficult, complex, involving teamwork, only in this way it is possible to be successful.

The team is large and complex, each element having its importance, and can not be replaced:

- GP
- obstetrician
- neonatologist
- pediatrician
- ENT doctor
- audiologist
- hearing aid specialist
- electronics-expert
- educational psychologist - audiologist
- the child's family

In conclusion, all stages are equally important, early detection should be followed by correction through cochlear implant or hearing aid, then the children must follow a lengthy, complex and difficult recovery and rehabilitation.

centered by one of the frequencies 500, 1000, 2000, 4000Hz,-so ASSR uses a frequency-specific stimuli, making the determination of hearing thresholds as a liminar tone audiogram.

ASSR advantages are:

- using a frequency-specific stimuli above and clicking tones and tone burst used by OAE and PEAP.
- is presents simultaneously to both ears, more specific stimuli
- can be used successfully in detecting severe and profound sensorineural hearing loss.
- is easy to interpret.
- may determine the slope and type of hearing loss.
- can be used to assess hearing at any age for those who can not make liminar tone audiogram.

In conclusion we can say one thing with certainty: no one method is perfect, infallible, all are imperfect, so that all methods should be performed in the clinical phase, then complete audiological diagnosis, stating topography and hearing loss measurements, the results obtained have to be compared with each method – CROSS.

When hearing loss is found in a child, the next step is to correct them with hearing aids and when the child is with cophosis (not hear anything) he will enter the program cochlear implant.

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