"Impact of Sensory Integration Program Therapy on Development of Hard of Hearing Children"

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Summary

The longer the brain is deprived of auditory input, the greater the resulting sensory deprivation, causing a lack of sensory stimulation to the brain. Not only does sensory deprivation prevent auditory learning, deprivation also prevents growth. In the absence of normal stimulation, there is a sensitive period of about 3.5 years during which the human central auditory system remains maximally plastic; after age 7, plasticity is greatly reduced. The longer the deprivation, the more "stunted" the auditory brain in growth. In fact, not only do the auditory centers not grow, existing pre-wired auditory tracts can also degenerate ***(Flexer et al., 2005).***

Successful integration of signals from the various sensory systems is crucial for normal sensory-perceptual functioning, allowing for the perception of coherent objects rather than a disconnected cluster of fragmented features ***(Russo et al., 2010)***.

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List of Abbreviations

ABR	Auditory brain stem response
AN	Auditory neuropathy
AN/AD	Auditory neuropathy/dys-synchrony
CAPD	Central auditory processing disorder
CMs	Cochlear microhonics
CNS	Central nerves system
DP	Dendritic potential
EABR	Electrically evoked auditory brainstem response
ECOCHG	Electrococleography
HL	Hearing loss
IHC	Hearing centre
MLR	Middle latency response
MSE	Multisensory enviroment
MSR	Multisensory room
OAEs	Otoacoustic Emission
PTA	Pure tone average
SBT	Stanford-Binet Test
SI	Sensory integration
SIT	Sensory integration test
SP	Summating potential
SSEPs	Steady state evoked potentials

Introduction

In the first seven years, a child learns to sense his body and the world around him to rise up and move effectively in that world. He learns what the different sounds mean and learns how to speak and how to interact with the physical forces. Sensory integrative functions develop in a natural order and way, which the child follows in the same basic sequences. Children who deviate a great deal from the normal sequence of sensory integrative development are apt to have trouble later on the other aspects of life **(Hutehenson et al., 1994).**

A sensory integrative disorder is not like a medical problem, chemical imbalance, virus infection, blood irregularity and tissue pathologies. A sensory integrative problem cannot be isolated in the society. We can only watch the child and try to guide how his brain is functioning. Only a trained observer can see the subtle differences between behavior that is based on good sensory integration and that based on poor integration **(Hirstwood, 2005).**

Sensology is a new educational term used to specifically describe a particular area of education or learning. It is used to describe the first sensory steps in early learning for everyone, including those with special educational needs and very special learners **(Hirstwood, 2005).**

Sensology describes a functional, operational, sensory education; it embraces the importance of the theory of early learning, through sensory stimulation, sensory experiences and multi-sensory environments. It is a vital part of the pre-requisites to learning skills everyone acquires in order

to access any level to thought. Using the 'Sensology' approach may lead to an understanding of more complex sensory perceptions, which form a concrete base for simple understanding. There is then an opportunity for a natural progression to not rely understood, but also to remember what has been learnt **(Flolonghorn, 2007).**

Young(2000) implied that the multi-sensory environment room (MSE) is a specially designed room based on the premises that everyone needs stimulation via a variety of lights, gentle stimulating music, aromas and tactile objects. The equipments are designed to promote relaxation, enjoyment and exploration as well as provide a learning environment for children of special needs.

A sensory room is extremely therapeutic for both children and adults with sensory processing disorders, from mild to severe. The room must be tailed to one's specific sensory needs, the reason for this is because it will become therapeutic depending on how, when and why the equipment or activities are used **(Lwin, 1994).**

Many children with sensorineural hearing losses have sufficient residual hearing to use hearing aids and aural/oral language as their primary mode of communication. Yet the degree of success in understanding speech varies widely in these children, even in those with the same degree and configuration of hearing loss **(Boothroyd, 1984).**

Auditory neuropathy is a disorder characterized by preservation of outer hair cell function with normal autoacustic emission, but with absent auditory brain stem. Presynaptic synchronization disorder is one of the

possible pathogenesis underlying auditory neuropathy **(Volter et al., 2007).**

The contribution of a two channel vibrotectile aid to the audiovisual perception of speech was evaluated in four young children with profound hearing loss using words and speech pattern contracts. An intensive and systematic training program was provided. The results show that the addition of the tactile modality to the auditory and visual modalities enhanced speech perception performance significantly on all test **(Haras et al., 1997).**

Children with deafness are at risk of vestibular dysfunction because in some forms of inner ear deafness the damage extends to the vestibular receptor as well. There are reports of peripheral dysfunction and delayed postural control in some types of congenital or early acquired deafness such as in inner ear malformations, meningitis, and sense forms of hereditary deafness **(Enbomeral et al., 1991).**

Auditory deprivation from birth brings about functional plastic changes in the CNS; of these changes are the activation of the meaning brain areas by different sensory sources as illustrated by the role of visual input in lip reading and sing language communication **(Zatorne, 2001).**

Deprivation of sensory input affects neurological development. Deafness whether treated by cochlear implants or not, results in a delay in development of complex motor sequence and balance and is associated with lower but non-pathological visual guso-praxic tasks and sustained attention **(Schlumberger et al., 2004).**

Perception concerns the identification and interpretation of sensory stimuli in our environment. Deliberate perceptual processing in the presence of childhood hearing impairment requires extra effort and more mental resources, thus limiting the availability of processing resources for other tasks **(Jergers, 2007).**

Aim of the work

1- To evaluate the effect of sensory activities on the development of hearing impaired children
2- To compare between the role of sensory activity on children with severe to profound auditory loss and wearing auditory aids, and children having auditory neuropathy.

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Howayda Moh. Khouessah

Chapter (1) Hearing loss

Hearing loss is a major community health problem that creates serious medico-social problems. It has been shown negatively affect physical, cognitive, behavioral and social functions, as well as general quality of life and lifestyle ***(Davis, 1995; Rosenhall et al., 1999)***. People with hearing loss are more likely to report symptoms of depression, dementia, dissatisfaction with life, reduced functional health, and withdrawal from activities ***(Non dahl et al., 1998)***.

The specification of hearing status of pure tone thresholds has many limitations when describing the overall effect of a hearing impairment. It is a common clinical experience in audiological practice that individuals with similar audiometric profiles will both describe and exhibit a wide range of hearing difficulties ***(Gatehouse, 1990)***. Despite that the pure-tone audiogram continues as the main descriptor of hearing for diagnostic, rehabilitative, demographic, and compensation purpose, it is a reflection of the absence of internationally accepted and standardized alternative ***(Noble, 1979)***.

Hearing impairment versus Hearing handicap

A number of terms are currently being used to describe or refer to persons who are experiencing hearing difficulty. Two basic concepts are of primary concern with regard to the person with a hearing problem, which are impairment and handicap ***(ASHA, 1981)***. The impairment deals with the organic status of the auditory mechanism while the handicap addresses the effect of this organic status on the person's everyday life situation as communicative, social, and emotional status of the individual ***(WHO, 1980)***.

Impairment does not always result in a hearing handicap, in as much as handicap depends on the individual and the unique circumstances of the individual. It may indicate a natural progression in hearing levels attendant to age and environment factors ***(Schow, 1990)***.

There are other terms used inconsistently in the literature, such as hearing disorder, hearing disability, and hearing loss. **Hearing disorder** refers to a specific organic condition related to a person's hearing impairment. **Hearing disability** is actually a subcomponent of hearing handicap; that is, disability refers to that part of the hearing impairment (organic manifestation), which affects the person's ability to earn a living and, thus covers the difficulties experienced in everyday life situations. **Hearing loss**