B. Ed. Spl. Ed (M. R. / H. I. / V. I)-
ODL Programme

AREA - B

B-7 : Introduction to Sensory Disabilities

(VI, HI, Deaf-Blind)

A COLLABORATIVE PROGRAMME OF
NETAJI SUBHAS OPEN UNIVERSITY
AND
REHABILITATION COUNCIL OF INDIA

AREA - B ● CROSS DISABILITY AND INCLUSION
COURSE CODE - B7
INTRODUCTION TO SENSORY DISABILITIES (VI, HI, DEAF-BLIND)

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The Self Instructional Material (SIM) is prepared in conformity with the B.Ed.Spl. Edu.(MR/HI/VI) - ODL Programme as prepared and circulated by the Rehabilitation Council of India, New Delhi and adopted by NSOU on and from the 2015-2017 academic session.

Dr. Ashit Baran Aich
Registrar, (Acting) NSOU

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From the Vice-Chancellor's Desk

Dear Students, from this Academic Session (2015-17) the Curriculum and Course Structure of B. Ed.- Special Education have been thoroughly revised as per the stipulations which featured in the Memorandum of Understanding (MoU) between the Rehabilitation Council of India (RCI) and the National Council for Teacher Education (NCTE). The newly designed course structure and syllabus is comprehensive and futuristic has, therefore, been contextualized and adopted by NSOU from the present academic session, following the directives of the aforesaid national statutory authorities.

Consequent upon the introduction of new syllabus the revision of Self Instructional Material (SIM) becomes imperative. The new syllabus was circulated by RCI for introduction in the month of June, 2015 while the new session begins in the month of July. So the difficulties of preparing the SIMs within such a short time can easily be understood. However, the School of Education of NSOU took up the challenge and put the best minds together in preparing SIM without compromising the standard and quality of such an academic package. It required many rigorous steps before printing and circulation of the entire academic package to our dear learners. Every intervening step was meticulously and methodically followed for ensuring quality in such a time bound manner.

The SIMs are prepared by eminent subject experts and edited by the senior members of the faculty specializing in the discipline concerned. Printing of the SIMs has been done with utmost care and attention. Students are the primary beneficiaries of these materials so developed. Therefore, you must go through the contents seriously and take your queries, if any, to the Counselors during Personal Contact Programs (PCPs) for clarifications. In comparison to F2F mode, the onus is on the learners in the ODL mode. So please change your mind accordingly and shrug off your old mindset of teacher dependence and spoon feeding habits immediately.

I would further urge you to go for other Open Educational Resources (OERs) - available on websites, for better understanding and gaining comprehensive mastery over the subject. From this year NSOU is also providing ICT enabled support services to the students enrolled under this University. So, in addition to the printed SIMs, the e-contents are also provided to the students to facilitate the usage and ensure more flexibility at the user end. The other ICT based support systems will be there for the benefit of the learners.

So please make the most of it and do your best in the examinations. However, any suggestion or constructive criticism regarding the SIMs and its improvement is welcome. 1 must acknowledge the contribution of all the content writers, editors and background minds at the SoE, NSOU for their respective efforts, expertise and hard work in producing the SIMs within a very short time.

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AREA - B

B-7 : INTRODUCTION TO SENSORY DISABILITIES (VI, HI, DEAF-BLIND)

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AREA - B
B-7 : INTRODUCTION TO SENSORY DISABILITIES (VI, HI, DEAF BLIND)

B - 7 ❐ Introduction to Sensory Disabilities

Unit-1 □ Hearing Impairment : Nature & Classification

Unit-1.1 □ Types of sensory impairments: Single(Hearing Impairment & Visual Impairment) & Dual sensory impairment (Deaf-Blindness)

Structure

1.1.1 Introduction

It is very interesting to know that 90% of the information about the world around us comes from our sight and hearing. We talk to each other, we read our bills, news papers and books, we see T.V., listen to the radio etc.

Medically there are four senses, viz., visual, auditory, gustatory and olfactory, which give special information about the environment; hence these are named as special senses. For example, visual sensation not only gives us the sensation of light but we extract much information from the scenery, e.g. soothing or repulsive, hostile or friendly and so on.

Every man has to right live independently. But some people live independently with some major impairment. This impairment varies in nature. Some are related to vision; some are auditory; mental and physical impairments are also to be counted in this nature.

1.1.2 Objectives

After going through this sub unit, the learners will be able to:

- understand the meaning of sensory disabilities
- know about the different aspects of hearing impairment
- know about the different aspects of visual impairment
- know about the different aspects of deaf- blindness

1.1.3 What is sensory impairment?

Going to details sensory impairment, we must know about two things. (1) The sensory system and (2) Receptors.

(1) The sensory system

This system is responsible for carrying different sensations resulting from stimulation of the sensory receptors by external or internal stimuli. For the purpose of perception, a

sensation is to be carried to the part of CNS (Central Nervous System) called sensorium.

(2) Receptors

The receptors associated with nervous system are called sensory receptors or neural receptors. A sensory receptor can be defined as a biological transducer which can convert (transduct) various forms of energy in action potential (AP) in the sensory nervous to which they are connected.

Medically receptors for special senses are

i) Vision : rods and cones,

ii) Hearing: hair cells,

iii) Taste : tests buds,

iv) Smell: olfactory neurones.

1.1.4 Meaning of sensory impairment

The sensory impairment means the senses that is sight, hearing, smell, touch, taste and spatial awareness, is no longer normal. Mainly the term 'sensory impairment' is used here to refer to people with either visual or hearing impairments or both - the extent of those impairments will vary from person to person. As an example, if a man wears glasses then he/ she has sight impairment, if find it hard to hear or have a hearing aid then call hearing impairment. A person does not have to have full loss of a sense to be sensory impaired.

1.1.5 Types of Sensory Impairment: Single (Hearing impairment & Visual Impairment)

The term sensory impairment encompasses visual loss (including blindness and partial sight), hearing loss (including the whole range) and multisensory impairment (which means having a diagnosed visual and hearing impairment with at least a mild loss in each modality or deaf blindness).In this context it is said that sensory impairment has two types. One is single and another is dual. Hearing impairment & Visual Impairment is under the single sensory impairment and Deaf-blindness is under dual sensory impairment.

1.1.5.1 Hearing impairment (HI)

Hearing is the ability to perceive sound. A person suffering from hearing impairment has difficulty in perceiving or identifying sound clearly due to auditory problems. So it is said that hearing impairment is hearing loss that prevents a person from totally receiving sounds through the ear. The impairment may be unilateral or bilateral. If the loss is mild, the person has difficulty hearing faint or distant speech. A person with this degree of hearing impairment may use a hearing aid to amplify sounds.

Meaning of Hearing Impairment

Hearing impairment refers to a defect in or damage to the hearing mechanism. This defect or damage may occur in any part of the ear, outer ear or middle ear or inner ear. Hearing impairment leads to hearing disability or loss of hearing. Hearing disability or loss of hearing may range of severity from mild to moderate to profound. A person may become deaf or hard of hearing depending upon the nature of impairment and the degree of hearing loss.

Classification

The degree of hearing loss can be classified five levels as listed below:

Degree of Hearing Loss	**Ability to perceive sound**
Mild	Difficult to identify soft sound such as whispering.
Moderate	Unable to hear clearly what others are saying during conversation. Hearing aids are necessary.
Moderately -severe	Unable to clearly hear loud noises such as telephone ring.
Severe	Can only hear very loud noises and sounds such as shouting or vacuum cleaner noise.
Profound	Difficult to perceive any sound.

According to impairment the two main types of hearing loss are:

Conductive hearing loss, which is the most common type and results from interference in the conduction pathways through which sound reaches the inner ear. This hearing loss usually affects the volume of sound reaching the inner ear. People

with conductive hearing loss may benefit from the surgical insertion of grommets or from hearing aids. It is commonly a temporary hearing loss.

Sensorineural hearing loss, which is caused by damage to the hair cells lining the inner ear, or the nerves that supply them. This hearing loss can range from mild to profound, and affects certain frequencies more than others. Consequently, people with sensorineural hearing loss need high quality hearing aids or cochlear implants to gain access to the spoken word and sound in the environment. It is also possible to have a mixed hearing loss, which arises from both the above.

Symptoms of Hearing Impairment

The symptoms of children with hearing impairment are:

During infancy:

1-3 months old	No response to sudden sound such as banging of door or ringing of doorbell.
4-6 months old	Unable to locate the sound source.
7-9 months old	Do not look at the person being mentioned, e.g . "Where is Papa?"
10-12 months old	No response to their names being called or frequently used words or phrases,e.g."come", "go".

During Childhood

- Delayed response to sound.
- Can not hear clearly what others are saying
- Show difficulty in locating the sound source
- Pay more than usual attention to speakers' facial expression and lip movement while listening
- Give irrelevant answers or misinterpret instructions
- Request for repetition during conversation
- Show poorer ability to understand speech in a noisy environment
- Tend to turn up the sound volume of television

- Incorrect pronunciation
- Delayed language development
- Poor attention in class
- Frequent use of gestures to express themselves, e.g. pointing to what they want
- Easily irritated as a result of communication difficulty

Parents should be alert to the possibility of hearing impairment if their child shows the above signs,and seek medical advice as soon as possible.

Causes of Hearing Impairment

Two factors are involved in various causes of hearing impairment. These are Congenital factors and Acquired factors.

Congenital factors mean those factors which are innate by birth. Such as

- Heredity
- Viral infection during pregnancy, e.g. rubella infection
- Congenital defects such as anomalies of the ear ,nose or throat
- Premature birth , birth asphyxia, excessive bilirubin etc.

Acquired factors mean those factors which are acquired after birth. Such as

- Excessive ear wax
- Eardrum perforation
- Middle ear effusion or infection
- Otoclerosis or ear ossicle dislocation
- Sequel of childhood disease such as meningitis
- Head or ear trauma
- Prolonged exposure to loud noise
- Medication that may lead to hearing damage
- Accident.

Above causes of hearing impairment are affecting the children's development in different side. Mainly problem arises in language development. Except this problem

Emotion and behaviour problem, lack of self- confidence, problems of social interaction, academic performance etc.

People who are profoundly deaf can hear nothing at all. In order to communicate spontaneously and rapidly with people, they are totally reliant on lip reading and/or sign language. People who are born deaf and lip-reading much harder to learn compared to those who became hearing impaired after they had learnt to communicate orally (with sounds).

Some diseases or circumstances can cause deafness, including:

Chicken Pox

Cytomegalovirus

Mumps

Meningitis

Sickle cell disease

AIDS- Offspring of mothers who had aids during pregnancy have a much higher risk of being deaf by the age of 16 years.

Syphilis

Lyme disease

Diabetes- Studies have shown that upto 40% of diabetes patients suffer from some kind of hearing loss.

Tuberculosis (TB)-Expert believe that the medication, streptomycin, used to treat TB may be the key risk factor

Hypothyroidism and underactive thyroid gland

Arthritis

Some Cancers

Second hand smoke exposure can increase hearing loss in teenagers

Many people globally have untreated hearing loss

The impact of hearing impairment on the child is determined by a variety of factors. Generally speaking, early treatment and training can help to minimize the developmental problems caused by hearing impairement.

1.1.5.2 Visual impairment (VI)

This term covers varying degrees of vision loss including those who are registered severely sight impaired (blind). Even the latter may have some vision, such as being able to tell the difference between light and dark. There are many conditions that cause different kinds of vision loss; the main distinction between conditions is whether the impairment is ocular (eye) or cerebral (brain).

Visual impairment is considered as the most severe and traumatic physical handicap. Since more impressions are conveyed to the brain through the eyes, the visual anomalies may influence the life of the individual in physical, mental, social, vocational and educational aspects.

Visual impairment (VI) refers to a significant functional loss of vision that cannot be corrected by medication, surgical operation, or ordinary optical lenses such as spectacles.

Meaning of Visual Impairment

It is an interesting phenomenon that visual impairment tends to evoke more awkwardness from us than any other disability. Why are we so uncomfortable about of blindness? For one thing blindness is visible. The blind person is usually not one who can easily weave himself into the fabric of a crowd. Unlike any other exceptional people he stands out. We often don't realize a person has impaired hearing until we talk to him.

There are two prevailing ways of describing visual impairment-the legal definition and the educational definition.

Legal definition of visually impaired—the legal definition involves assessment of visual acquity and field of vision. The American Medical Association (AMA) proposed the definition. This definition is now accepted by the American Foundation for the Blind (AFB) and other Blind Association in different countries.

"A legally blind person is said to be one (1) who has visual acquity20/200 or less in the better eye even with correction, (ii) whose field of vision is so restricted that it subtends an angle of 200 or less in the better eye after correction."

Visually impaired are those who suffer from either of the following conditions (Ministry of Social Welfare 1987) - a) Total absence of sight,

b) Visual acquity not exceeding 6/60 or 20/200(Snellen) in the better eye correction lenses,

c) Limitation of the field of visual subtending an angle of 20 degree or worse.

Within this broad definition, visually impaired children are differentiated into two categories, the blind and the partially seeing or low-visioned.

Educational definition of visually impaired- educationally defined, the blind child is defined as one whose visual loss indicates that he/she should be educated chiefly through the use of Braille and other tactile and auditory materials. The partially seeing child is defined as one who has some remaining useful vision and can use print and other visual materials as part of the educational programme.

Sensory Training and Mobility

In a visually impaired individual, the loss of sight is compensated by sense of touch and hearing. Sense of touch enables the persons to determine his position and direction. Hearing play a dominant role in mobility.

Explorations of an object through touch determine the definiteness of the object and help the individual to form a neat conception of them. Sense of touch also has a lot to do with reading. During his travel the smell of a gutter, the smell of smoke of a chemical industry (like paper factory, sugar factory etc.), smell of kitchen products etc. are source of information for the person to locate where he is, this leads to a greater level of confidence in mobility.

Daily living skills

These are also called as 'survival skills'. These build up confidence specially among visually impaired children. These are necessary for day to day living. Some of the common daily living skills are eating manners using toilet, dressing body hygiene, cleanliness, taking bath, washing cloth, handling money, shopping, shaving, proper use of electrical appliances, food preparation, cleaning of place, using medicine etc. learning daily living skills of a visually impared child are means of his proper social development also. These skills are difficult but not impossible to learn.

Classification

The degree of visual impairment can be classified into three levels:

Mild	• Can read relatively larger characters. • No difficulty in identifying shapes ,colours and brightness contrast
Moderate	• Can tell shapes and colours of objects and can distinguish between brightness and darkness • Can only read characters with larger size and broader strokes
Severe	• Can only distinguish more obvious changes in brightness and darkness • May not see anything(completely blind)

The visually impaired children have been classified medically which are shown in the following table:

Category/ Level	**Better Eye**	**Worse Eye**	**Percentage of Impairment**
Level D	6/9-6/18	6/24-6/36	20%
Category I	6/18-6/36	6/60-nil	40%
Category II	6/60-4/60 or Field of Vision 100-20	3/60-nil	75%
Category III	3/60-1/60 or Field of Vision 100	F.C. at 1 ft. To nil	100%
Category IV	F.C. at 1 ft. To nil or Field of Vision 100	Field of Vision 100	

There are two major categories of visually impaired children :

(i) The partially sighted are those who require large print or magnified print materials. Their visual acquity is very low (20/70 in the better eye).this means that the child sees at 20ft when a normal child sees at 70 ft. Their eyesight may be weak

due to short sightedness, long sightedness, Such astigmatis need , glaucoma or muscle detachment.

(ii) The blind are those who need to be taught through Braille or through aural methods their visual acquity may fall to 2/200.Such children must be prepared in preacademic skills like braille reading and use of cane for mobility before integration.

Symptoms of Visual Impairment

The symptoms of children with visual impairment are:

During infancy:

- Lack of eye contact
- Blinking to bright light
- Do not look at his /her hands
- Do not visually follow moving objects in front of his /her face
- Slow response to voiceless toys or parents' faces; respond only to sound
- No imitation of others' expressions and actions
- Do not actively reach out for his /her favourite toys
- Fear of gross motor activities ,such as crawling

During early childhood

- Often keep his/her head down; lack eye contact with others
- Limited facial expression and body language
- Tend to hold objects very close to the eyes when looking at them
- Abnormal responses to bright to light (gazing at light excessively or trying to avoid it)
- Often bump into objects or fall over , and get confused with directions
- Search for his/her way using hands
- May press on eyeballs with fingers
- Jerky movements of the eyeballs

Causes of Visual Impairment

Loss of vision or impairment of vision is caused due to many reasons. Injury to the eye, inherited conditions, infections etc. are the main common causes that lead to vision loss or visual impairment. Generally causes of Visually Impairment are divided into two parts. One depends on systematic conditions and another is specific eye conditions.

SYSTEMIC CONDITIONS

- Dia etes
- Hy rtension (high blood pressure)
- Ce rovascular (brain blood vessel) disease or stroke
- ther osclerotic disease (cholesterol deposits in blood vessels, including those f the
- Huma eficiency virus (HIV) usually due to infection with cytom hat affects the eye
- Vitam
- Infecti

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ECIFIC E

- Macul
- Catara
- Glauc increa
- Eye in
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Injury

- The commonest cause of vision loss is injuries to the cornea.

Inherited conditions of blindness and vision impairment

- The most common cause of inherited blindness is retinitis pigmentosa.

Infections of the eyes

- The baby may be born with blindness or visual impairment if the mother has had a viral infection like German measles that is transmitted from the mother to the developing foetus during pregnancy.
- Trachoma of the eyes caused by contagious microorganism called *Chlamydia trachomatis* may also damage eye sight. This is seen in the developing and underdeveloped countries with poor water and sanitation facilities.

Amblyopia

- Generally Amblyopia means impaired vision in one eye due to lack of its use in early childhood.
- It is seen in squint or "lazy eye" since both the eyes project differently and send in different messages to the brain the brain may then turn off or suppress images from the weaker eye.This stops development of the weaker eye leading to amblyopia in that eye.

Cataract

- Cataract means clouding of part or the entire lens of the eye.
- Normally, the lens is clear to let in the light that focuses on the retina. Cataracts prevent light from easily passing through the lens, and this causes loss of vision.
- Due to cataract cloudy or blurry vision, difficulty in seeing in dimly lit areas and bright lights, colours appear faded, double vision etc. happen. This condition usually affects the elderly.
- Cataract is the leading cause of blindness in the world compared to other eye disorders.

Diabetic retinopathy

- The small blood vessels in the retina are affected due to diabetes for which impairment of vision is caused.

- This is the commonest cause of blindness and visual impairment in the United States.

Glaucoma

- Raised pressure within the eyes is caused due to Glaucoma. The increased pressure impairs vision by damaging the optic nerve.
- This may be seen in older adults and in some babies as well who are born with the condition.

Age related Macular Degeneration

- The progressive loss of the visual acuity due to damage to the macula that is the most sensitive part of the retina is called Age related Macular Degeneration or AMD.
- Due to AMD the center of the visual field appears blurry or opaque. The patient is unable to focus clearly. This mainly occurs in the elderly.
- Those who are exposed to excess sunlight and those who smoke excessively may suffer from AMD.

AIDS related visual impairment

- Viral infections of the eyes called Cytomegalovirus or CMV retinitis may cause AIDS related visual impairment.

Cancer of the eyes

- The most common eye cancer of children is called Retinoblastoma.

1.1.5.3 Dual Sensory Impairment (Deaf-Blindness)

Meaning of dual sensory impairment

It is the combination of both hearing and sight impairment. It is not necessarily a total loss of both senses - indeed the majority of dual sensory impaired people do have some degree of sight and/or hearing. Those with a less severe degree of both sight and hearing impairment may also be referred to as having a dual sensory impairment or loss. The words dual sensory impaired and deaf-blind are generally accepted as inter-changeable words.

When a person has difficulties seeing and hearing then the person can be termed deaf-blind. Although it is more common to refer to someone as being deaf-blind if their combined sight and hearing loss causes difficulties for them with communication, mobility and access to information.

The combination of the two sensory impairments intensify the impact of each other, which usually means that a deaf-blind person will have difficulty, or find it impossible, to utilise and benefit fully from services for deaf people or services for blind people. Meeting the needs of deaf-blind people therefore requires a separate approach.

Deaf-blindness is a unique and extremely complex disability that often requires specialist communication methods and and systems being introduced to the person and those around them to enable communication to take place.

Deaf-blindness has adverse effects on all areas of development, in particular the language acquisition process, conceptual development, motor development, behaviour and personality of a person.

People who are deaf-blind can generally be separated into two groups:

Congenital Deaf -blindness - People who were born with a hearing and vision impairment.

This category may also include individuals who are born hearing - sighted, but who become deaf-blind through accident or illness within the first months of their lives. The important factor being that they become deaf-blind before they had the opportunity to gain formal language skills.

Acquired Deaf-blindness - People who develop deaf-blindness later in life.

Three combinations are possible :

a) Individuals who are born blind and later develop a hearing impairment.

b) Individuals who are born deaf and later develop vision impairment.

c) Individuals who are born sighted and hearing, but later develop a vision and hearing impairment.

Every deaf -blind person is an individual and may not fit neatly into any of the above categories, or use the suggested means of communication. Their situation may be complicated by the existence of other factors such as physical and/or learning disabilities etc.

Symptoms of deafblindness

Levels of hearing and sight loss vary between individuals who are deafblind.

Hearing loss

In deafblindness, hearing loss can occur from birth or may develop later after an infection or injury. In other cases, a person's hearing may gradually deteriorate over time.

Someone with impaired hearing may find that speech and other noises sound muffled and indistinct and they may not be able to follow and understand conversations, particularly when there's background noise.

A person with a hearing problem may also need to turn up the volume on the television or radio and ask others to speak loudly, slowly and more clearly.

Sight loss

A person who is deafblind may have developed a condition that gradually causes their vision to deteriorate. For example, they may have an eye condition such as:

- cataracts - cloudy patches that form on the eye's lens
- glaucoma - pressure changes inside the eye that damage the optic nerve (the nerve that transmits images from the eye to the brain)
- retinopathy - a number of eye disorders that damage the blood vessels of the retina (light-sensitive tissue at the back of the eye) and can lead to vision loss

Common symptoms of conditions that cause progressive sight loss include:

- eye pain
- blurred vision
- halos around light sources
- reduced night vision
- difficulty seeing in bright sunlight or well-lit rooms

Causes of Deaf-Blindness

There are many causes of deaf-blindness. Those that are present or occur around the time a child is born include prematurity, childbirth complications, and numerous congenital syndromes, many of which are quite rare. Deaf-blindness may also occur

later in childhood or during adulthood due to causes such as meningitis, brain injury, or inherited conditions.

Congenital deafblindness is when people are born deafblind.

Some people become deafblind later in life and this is called acquired deafblindness.

Many people who are deafblind have rare and varied causes of their sight and hearing loss. They may experience other disabilities and health conditions, meaning that diagnosis and the identification of sight and hearing loss are difficult.

Causes of deafblindness include:

- Infections during pregnancy
- Prematurity
- Rare syndromes, such as Usher and CHARGE
- Illness and accidents
- Sensory loss in old age

Many children with profound and multiple learning disabilities will experience limited communication skills and impairments of vision and hearing.

Congenital rubella syndrome is no longer a significant cause of deafblindness, but other infections during pregnancy are a factor, for example cytomegalovirus and toxoplasmosis.

One in ten babies born prematurely will develop a permanent disability such as cerebral palsy, blindness, deafness or lung disease, or a combination of these.

Illness and accidents can lead to sensory loss in children and adults, and a number of conditions lead to a loss of sight and / or hearing over time.

Sensory loss is just one more effect of old age. A hearing and vision loss may have crept up slowly on a person, so they only gradually realise something is wrong. As a result the everyday difficulties a person describes are not just to do with ageing but are the typical effects of deafblindness.

Below is a list of potential causes of deafblindness with links to websites containing additional information.

Please note that the information on these pages is for information purposes only. It should never be used for diagnostic or treatment purposes.

If you have questions regarding a medical condition, always seek the advice of your general practitioner or other qualified health professional.

Rubella

Rubella is a mild and preventable disease caused by a virus. If you catch it you may feel unwell, with swollen glands, a slight temperature, or a sore throat and rash.

But some people have no symptoms at all and so are unaware that they may be infectious and may be passing on the disease.

Rubella is very serious if a pregnant woman catches it in the early stages of her pregnancy because it can profoundly damage the development of her unborn child. It can result in deafblindness or raise the possibility of a termination.

Ensuring that children are routinely vaccinated helps to protect pregnant women and their babies.

Congenital rubella syndrome

A baby born affected by rubella is said to have congenital rubella syndrome (CRS). Many will have hearing loss, cataracts, other eye conditions, and heart problems that require significant hospital treatment and will affect the child throughout their life. A baby's brain can also be affected.

The risk of congenital rubella syndrome affecting the baby and the extent of the birth impairments it causes depends on how early in the pregnancy the mother is infected. The earlier in the pregnancy the greater the risks.

German measles is a common term used to describe rubella.

1.1.6 Let us sum up

90% of the information about the world around us comes from sight and hearing. Medically there are four senses, viz. visual, auditory, gustatory and olfactory, which give special information about the environment; hence these are named as special senses. Some people live with some major impairment which is related to vision, auditory, mental & physical. Sensory impairment has two types- Single & Dual. Hearing and visual impairment is under single sensory impairment and deaf-blindness is under dual

sensory impairment. A person suffering from hearing impairment has difficulty in perceiving or identifying sound clearly due to auditory problems which prevent a person from receiving sounds through ear. Visual impairment is considered as the most severe and traumatic physical handicap and it may influence the life of an individual in physical, mental, social, vocational and educational aspects. Dual sensory impairment is the combination of both hearing and sight impairment (Deaf-Blindness).

1.1.7 ''Check your progress''

Q.1. What are the two types of sensory impairment?

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Q.2. Which type of impairment comes under single sensory impairment?

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Q.3. What do you mean by Congenital Factors for causing Hearing Impairment?

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Q.4. What are the two conditions that cause visual impairment?

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Q.5. Write the name of two diseases which affect all types of sensory impairment?

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1.2 □ Importance of hearing

Structure

1.2.1 Introduction

1.2.2 Objectives

1.2.3 Why hearing is important

1.2.4 What are the consequences of hearing loss?

1.2.5 Effect of hearing in living

1.2.6 How hearing loss can affect in everyday situations

1.2.7 How hearing works

1.2.8 Anatomy of the Ear

1.2.9 Hearing Loss Impacts

1.2.10 Tips for parents

1.2.11 ‘‘Check your progress’’

1.2.1 Introduction

"Blindness separates people from things. Deafness separates people from people." There is no better way to describe why hearing is of such great importance in our lives than the words of the philosopher Immanuel Kant. Hearing helps us to establish contact with other people, holding an intimate conversation or simply laughing together - hearing means communication and is an irreplaceable component of our social lives. An unborn child already picks up sounds, voices, and even music.

Hearing is used round the clock. It is key to communication and hence to social interaction. The ear is man's most efficient but also most sensitive sensory organ. However, proper importance is not given to it by our modern, visually-oriented world.

Considering the importance of hearing to one's career, interpersonal relationships, achievement, and safety, it is not surprising to find that the costs of hearing loss are

widespread and grave. Readiness is disrupted by noise-induced hearing loss and result in decreased effiency.

For service member, hearing is considered as the most important survival sense. Sound is often the first source of information a warrior has before direct contact with the enemy. As such, hearing is vital for both lethality and survivability. In the military, hearing is fundamental to the instruction, teamwork and reporting skills that are necessary for mission accomplishment. Moreover, hearing is essential for forging relationships and connections with friends and family, fully participating in team and community activities, and experiencing life events.

1.2.2 Objectives

After going through this subunit the learners will be able to

- know about the importance of hearing
- understand the effect of hearing in living
- know about the process of hearing
- know about the impacts of hearing loss

1.2.3 Why is hearing important?

Hearing empowers us and enriches our lives. Hearing enables us to socialise, work, interact, communicate and even relax. Good hearing also helps to keep us safe, warning us of potential danger or alerting us to someone else's distress.

Hearing is very much important for us to be able to live and participate in life more effectively. Hearing problems may lead to feelings of isolation and even depression. Our hearing provides us with an enormous source of information, which forms the bridge between the worlds and how we interact with it.

The ability to hear is an integral part of our lives. The importance of good hearing and the consequences of hearing loss are still underestimated. Due to the demographic aging of our society and the growing noise pollution in our environment, the number of people affected by hearing loss continues to rise.

1.2.4 What are the consequences of hearing loss?

Serious consequences are often faced by the people with untreated hearing loss. These range from disadvantages at work, relationship problems and social isolation, which may even lead to depression. Since the development of speech and language of children is fundamentally dependent on the sense of hearing, the consequences are severe for the children with an untreated hearing loss.

1.2.5 Effect of Hearing in living

Every part of our life is influenced by hearing. Hearing accompanies us throughout our life. Hearing enables us to communicate with others. Sounds are there with us in our daily life - some relax us, others cause stress. Much of what we hear we enjoy. There are everyday sounds we no longer even notice, and other noises we would rather just avoid. Our ears help us to communicate with other people, to listen to music or make music ourselves.

Our hearing is partly responsible for how well we sleep at night. The quality of our hearing also affects our personal relationships and happiness in our partnerships.

Two important things of hearing in living

The first important thing is that so many areas of our everyday life are influenced by hearing. that improved hearing has one benefit above all others: enhanced quality of life. Better hearing means better communication - in our relationships with our partners, as well as toward friends and family. Good hearing is not merely of benefit to ourselves : its positive effects are also directly measurable among family, relatives and partners.

The second important thing is that we are able to experience life in a more active, healthier way, and with fewer restrictions with better hearing. Stress is reduced, or may be avoided in the first place, concentration is improved, and relaxation is easier. Moreover good hearing also contributes to enhanced personal wellbeing and general health.

Healthy hearing allows us to communicate. to socialize with friends, to alert us trouble and work more effectively. Healthy hearing even helps us to relax.

So when our hearing declines which happens for most people at some point -it can feel like much of our life is going downhill. The fact is, hearing loss doesn't just affect us physically. It can impact our emotional and social health, too.

Left untreated, hearing loss is often related to:

- Negative attitudes, anger and irritability
- Stress, fatigue anred tension
- Depression
- Loneliness
- Desire to avoid social scenes
- Unsafe situations due to decreased alertness
- Lower job performance
- Trouble remembering things or following directions

Many people chalk these symptoms up to old age. But in truth, hearing loss occurs in every age group. It's especially important to catch hearing loss in children since hearing is so essential to language development and hearing skills. But adults young and old also need to watch for signs of hearing loss so that they can make the most of their quality of life.

Hearing helps us to lead our everyday lives without limitations.

1.2.6 Everyday situations that can be affected by hearing loss

Hearing is important...

... at work

- Participating in group meetings.
- Talking on the telephone.
- Following a conversation in a busy office.

... at social occasions

- Chatting to friends.
- Participating in dinner conversation at a restaurant.
- Interacting with grandchildren.
- Talking on the telephone.
- Watching TV together with others.

... for our own safety

- When walking near busy roads.
- To be able to hear sounds that alert us to danger like sirens and other traffic signals.
- So we can be alert to a cry for help.

... when we learn

- Allowing us to maintain a high level of concentration with little effort.
- So we are able to communicate with instructors.
- So we are able to register information accurately.

1.2.7 How hearing works

The ear, despite its small size, is a highly complex organ. Acting as sound filter, the ear transforms every sound audible to us into accurate information the brain can prioritise.

Each ear consists of delicate and highly complex mechanisms. In "the inner" ear, a sea of tiny sensory cells and nerve fibres pick up sound vibrations and transform them into electrical impulses for the brain to process.

The sensory cells and fibres can become damaged if the ear is exposed to strong vibrations over time. If these are unable to heal or be replaced, this can lead to permanent hearing loss.

Hearing works in six steps. These are

1. Sound funnels into the ear canal and causes the eardrum to move.
2. The eardrum vibrates with sound.
3. Sound vibrations move through the ossicles to the cochlea.
4. Sound vibrations cause the fluid in the cochlea to move.
5. Fluid movement causes the hair cells to bend. Hair cells create neural signals which are picked up by the auditory nerve. Hair cells at one end of the cochlea send low pitch sound information and hair cells at the other end send high pitch sound information.
6. The auditory nerve sends signals to the brain where they are interpreted as sounds.

1.2.8 Anatomy of the ear

The ear is made up of three parts:

- the outer ear (the external ear and the ear canal)
- the middle ear (the ear drum and three very small bones)
- the inner ear (the cochlea and auditory nerve)
- Sound travels through the air in waves resulting in a series of vibrations within the ear. The brain then interprets those signals into meaningful sounds such as speech.

Our ears are small but highly complex amplifiers.

OUTER EAR

At the end of the ear canal, the sound waves hit the ear drum. The ear drum is a thin membrane between the outer ear and middle ear.

MIDDLE EAR

The ear drum is connected directly to the hammer. The three tiny bones - hammer, anvil and stapes-are the smallest bones in human body, and transmit the mechanical vibrations of the ear drum into the inner ear.

INNER EAR

The stapes transmits the vibrations via the oral window to the inner ear. In this way, the sound waves arrive in the cochlea, which is filled with fluid.

1.2.9 Hearing Loss Impacts:

Health:

Hearing loss has been linked to feelings of social isolation, depression, and chronic disease.

Safety:

Hearing loss can cause threat so far as safety of our service members is considered since it diminishes their ability to send, receive, and respond to commands and warning signals and can result in the misinterpretation, or miscommunication, of critical information.

Quality of Life :

Hearing helps us to enjoy our life fully which helps to shape the quality of our life. The impact of hearing loss for our military personnel is not only significant on the battlefield but also at home and in their interpersonal lives. It still impedes one's ability to participate in and experience many of life's cherished moments, such as hearing a loved one's voice or laughter, participating in meaningful conversations with friends and family, hearing birds chirping or waves crashing on the beach, or enjoying one's favorite shows or sports on TV.

Mission accomplishment :

For effective operational planning and execution communication is a must. Hearing loss can disrupt communication and therefore substantially impede a service member's ability to carry out his or her mission. Miscommunication or misinterpretation of a command/order/ instruction, may happen due to hearing loss which can have dire consequences for the service member and the unit at large.

Hearing loss also contributes to a hefty economic toll. In addition to the indirect and direct costs associated with veteran compensation for hearing loss and related injuries, which accounts for billions of dollars annually, these injuries also result in expenses in the form of decreased productivity, loss of qualified service members, and recruitment and retraining costs.

1.2.10 Tips for parents

Of babies with hearing loss

- Above all, babies with hearing loss need exactly the same as all children: the love, patience and attention of their parents.
- Even when their baby is still an infant, parents should try to maintain eye contact when speaking to them. Their facial expressions and gestures should match what they are saying.
- Hearing loss in your baby should not be a taboo subject: if it is spoken about openly from early on, it is easier for the parents, and later also the child, to treat it as something natural.

When children learn to speak

- Parents should treat their children as normally as possible.

- Parents should speak as clearly as possible, maintain eye contact with their child when speaking, and teach their child to always look at the person talking to them. If the child does not understand everything they say, they should repeat what they said using different words.
- Even at a very young age, children should be encouraged to ask if there is anything they have not understood correctly.
- Parents should make sure that background noise is kept to a minimum when speaking to their child.
- If parents read picture books to young children, they should bring the pictures to life with sounds as well as reading the text provided (e.g., imitating animal noises). This will enable children to imitate sounds and learn from an early stage how to participate verbally in communal reading.

How to successfully master school life

- Parents should get to the bottom of unusual behaviour at school or concentration difficulties as soon as possible: hearing loss could be the cause.
- If opting for a mainstream school, a few points should first be clarified with the classroom teacher: the student in question should sit as close to the front as possible (for better comprehension / lip reading where applicable) and the teacher should use an FM/Roger system.
- Speech or music therapy can also provide additional support for the child. As well as enhancing the child's verbal and communication skills, this can also promote reading and writing skills.

1.2.11 Let us Sum up

Blindness separates people from things and deafness separates people from people. Hearing means communication & is an important component of our social lives. The ear is man's most efficient & sensitive sensory organ. If we consider the importance of one's career, interpersonal relationships, achievement & safety, it is not surprising to find the costs of hearing loss are widespread & grave. Operational effectiveness is decreased due to Noise Induced Hearing Loss. Sound is often the source of information a warrior has before direct contact with enemy. As such, hearing is very vital for lethality & survivality. Hearing enables us to socialise, work, interact, communicate & even relax. Safety of an individual as well as other depends on good hearing capacity. Problems

of hearing may lead to feeling of isolation & even depression. If treatment is not done for hearing loss, people may face with serious consequences like disadvantages at work, relationship problem, social problem which may lead to depression. There are two important things of hearing in living. Firstly, better hearing means better communication effects in relationship with partners, friends and family. Secondly, better hearing helps us to reduce stress, improve concentration and easy relaxation. On the other hand, effect of hearing loss is observed in our emotional & social life. Hearing helps us lead our everyday life without limitations. Impact of hearing loss is observed at work, at social occasions, safety on road & workplace and in learning practices. Our ear consists of three parts - Outer ear, Middle ear & Inner ear. Sound travels through the air in waves resulting in a sense of vibration within the ear. The brain then interprets those signals into meaningful sounds such as speech.Care is required to be taken for the children having hearing loss problem since the development of speech and language of children is fundamentally dependent on sense of hearing.

1.2.12 ‘‘Check your progress’’

Q.1 In which areas of one's career is hearing important?

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Q.2 How many steps are involved in hearing process?

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Q.3 How many parts are there in the ear?

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Q.4 Write the name of three tiny bones of middle ear.

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Q.5 Write one of the important things of hearing in living.

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1.3 □ Process of hearing & its impediment leading to different types of hearing loss

Structure

1.3.1. Introduction

Hearing comes first and then speaking. Learning process of most students starts with

their hearing. One of the earliest link infants develop is between what they hear and what they see. Our speaking vocabularies depend on our hearing vocabularies (the words we understand). Hearing enables us to know more than we can say. Language acquisition and the knowledge of the world that comes with it are naturally occurring process for all students.

Deaf or hearing impaired students experience their world in a markedly different way than do their hearing peers. Without early and special help they may not acquire spoken language. For effective education and socialization speech and language are critical avenues in our society. Hearing impaired students may be cut off this processes and become isolated unless early identification is done and helped to compensate for their hearing loss by undergoing corrective medical treatment or learning to use amplification, normal ways of receiving and expressing language, or various types of assistive devices.

So, it is very much important to know the process of hearing, types of hearing loss and its impediments leading to different types of hearing loss if we want to know regarding hearing impairment.

1.3.2 Objectives

After going through this subunit the learners will be able to

- know about the Process of hearing
- know the different parts of the Ear
- state the functions of the Ear
- know about the types of hearing loss

1.3.3 Process of Hearing

Through our organ- Ear, we are able to acquire hearing, auditory perception, or audition to perceive sound by detecting vibrations, changes in the pressure of the surrounding medium through time, we may hear sound through solid, liquid, or gaseous matter. It is one of the traditional five senses; partial or total inability to hear is called hearing loss.

For humans and other vertebrates, hearing is performed primarily by the auditory system. Vibrations (mechanical waves,) are detected by the ear and transduced into

nerve impulses which are perceived by the brain (primarily in the temporal lobe). Like touch, audition requires sensitivity to the movement of molecules in the world outside the organism. Both hearing and touch are types of mechanosensation.

During hearing, sound waves enter the auditory canal and strike the eardrum, causing it to vibrate. The sound waves are concentrated by passing from a relatively large area (the eardrum) through the ossicles to a relatively small opening leading to the inner ear.

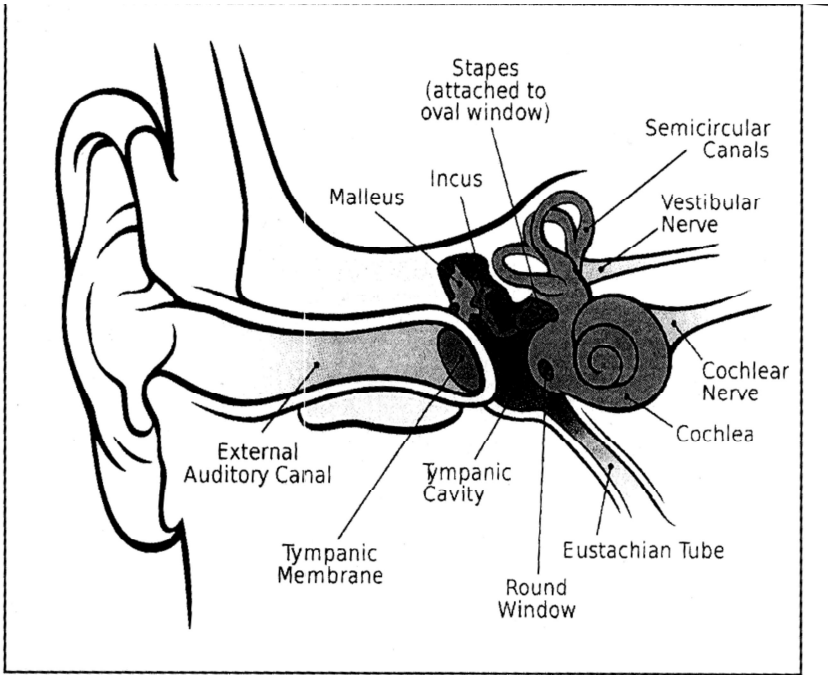


Fig 1

For knowing the hearing process it is necessary to know about the anatomy of the Ear.

Anatomy of the Ear

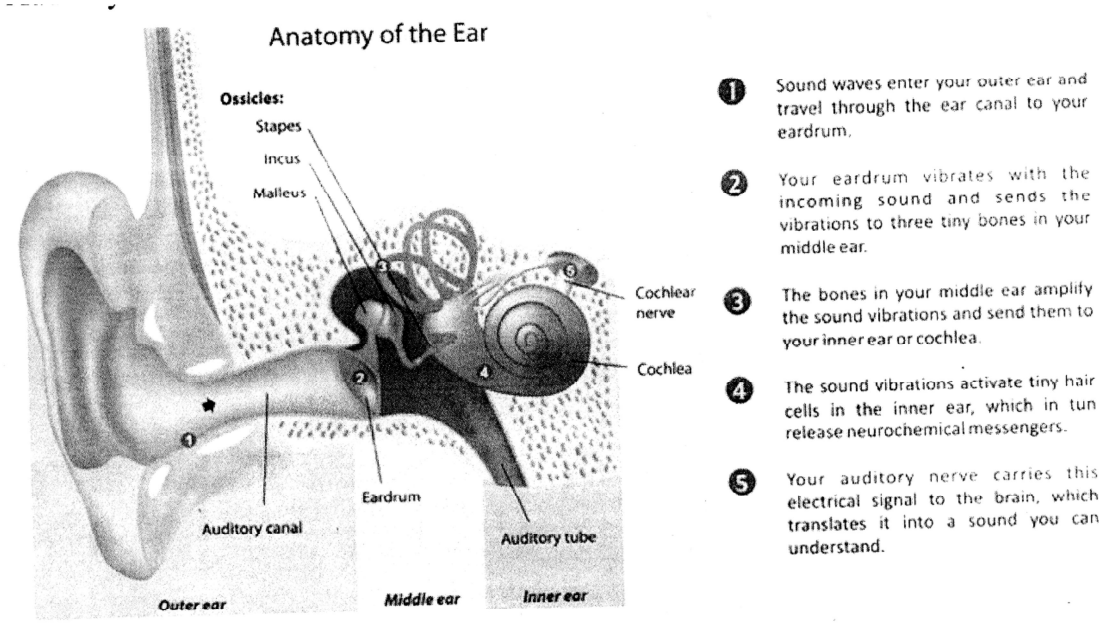
To understand properly about the hearing loss, it is necessary to first understand the anatomy of the ear. The ear has three main parts: the outer ear, the middle ear and the inner ear

External Ear

- Pinna (auricle) - collects and funnels sound into the ear canal
- Ear canal (external auditory meatus) - directs sound into the ear

Middle Ear

- Eardrum (tympanic membrane) - changes sound into vibrations
- Ossicles or Hammer, anvil and stirrup (malleus, incus and stapes) - this chain of three small bones (ossicles) transfers vibrations to the inner ear Inner Ear
- Inner ear (cochlea) - contains fluid and highly sensitive "hair" cells. These tiny hair-like structures move when stimulated by sound vibrations
- Vestibular system - contains cells that control balance
- Auditory nerve - leads from the cochlea to the brain



External Ear

The external or outer ear is the outer most portion of the ear. It has two parts-

(i) Pinna and (ii) Ear canal.

(i) Pinna (auricle)

The Pinna or Auricle is that part of the ear which we can see from outside. The pinna is of conical shaped structure and is attached to the head, on either side, at an angle of 30 to 40 degree. The various portions of pinna play an important role in human

hearing. The entire pinna or auricle is made up of an elastic cartilaginous structure and it has no bones. The pinna remains live and active due to the blood and nerve supply.

Ear canal (external auditory meatus)

The external auditory Canal/Meatus is "S" shaped tube that opens at the pinna but closed inside by the tympanic membrane or eardrum. The length of an adult auditory canal is about 25 to 40 mm and has a volume of about 2 cc. The outer two third portion of the ear canal is cartilaginous one while the inner one third portions is bony i.e., has bony base. The entire canal is lined with skin and epithelial cells. The outer portion of the ear canal also has hair follicles on the skin. A pair of glands namely cerumenous and sebaceous glands is present on the both sides of the external auditory Canal/Meatus. The ear canal carries out its functions in smooth and appropriate manner due to the blood and nerve supply.

Middle Ear

The middle ear is a small air filled cavity of about 2cc. It is located between the external ear and the inner ear. The middle ear is that portion of the ear, which plays a very vital role in "Bio medical Engineering" activities of the human ear. The middle ear has two important parts - (i) Eardrum and (ii) Ossicles.

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Eardrum (tympanic membrane)

It forms the outer wall of the middle ear cavity. The tympanic membrane is commonly known as eardrum. It is a very thin membrane and its thickness is about 1/10th mm. The normal tympanic membrane is pinkish in colour. It is roundish oval in shape. It is also concave. It has an area of about 85 to 90 sq.mm. The conical shape of the tympanic membrane transmits maximul sounds into the middle ear.

Ossicles or Hammer, anvil and stirrup (malleus, incus and stapes)

The middle ear has three small bones known as the ossicles. These three bones are the smallest bones in human body, which are joined to one another and thus form a chain. The chain is commonly known as ossicular not only transmits sound waves from the middle ear to inner ear but also helps to amplify sound.

Malleus: It is a hammer shaped bone which has two handle, its long handle is attached to the tympanic membrane and short handle is free. For its typical hammer shape, it is known as "malleus".

Incus : This is second smaller bone of the ossicular chain .It is an anvil shaped bone

with the head and two handle like structures. The head of the malleus is attached to the head of the incus. The long handle of the incus is attached to the third ossicle called Stapes, while the short handle is free.

Stapes: This is the smallest bone not only in the middle ear but also in the whole body. It is a stirrup shaped bone with a small head and an oval shapped footplate. Among all three ossicles, stapes plays very vital role in both transmission and amplification of sound waves from middle ear to inner ear.

Inner Ear

Inner ear is also known as an internal ear. It is also referred to as Bony Labyrinth as it consists of a set of complicated tubes in it. It is also called as vestibule since it has a passage to the other portions of the auditory system and brain. Both the organs of hearing as well as the organ of the balance are situated in the inner ear. The main three parts of the inner ear are Cochlea, Vestibular system and Auditory nerve.

Cochlea:

Cochlea, the organ of hearing is a snail shaped bony structure. It is made up of a twisting bony shell, which is about 1cc wide and 5 mm broad from base to apex. The cochlea is divided into three fluid-filled parts. Two canals are for the transmission of pressure and the third one is the sensitive organ of Corti, which detects pressure impulses and responds with electrical impulses which travel along the auditory nerve to the brain. It is divided lengthwise by the organ of Corti, which is the main organ of mechanical to neural transduction. Inside the organ of Corti is the basilar membrane, a structure that vibrates when waves from the middle ear propagate through the cochlear fluid - endolymph. The basilar membrane is tonotopic, so that each frequency has a characteristic place of resonance along it. Characteristic frequencies are high at the basal entrance to the cochlea, and low at the apex. Basilar membrane motion causes depolarization of the hair cells, specialized auditory receptors located within the organ of Corti.[5] While the hair cells do not produce action potentials themselves, they release neurotransmitter at synapses with the fibers of the auditory nerve, which does produce action potentials. In this way, the patterns of oscillations on the basilar membrane are converted to spatiotemporal patterns of firings which transmit information about the sound to the brainstem

Vestibular system

In most mammals, the vestibular system, is the sensory system that provides the leading contribution about the sense of balance and spatial orientation for the purpose of coordinating movement with balance. Together with the cochlea, a part of the auditory

system, it constitutes the labyrinth of the inner ear in most mammals, situated in the vestibulum in the inner ear (Figure 1). Since movements consist of rotations and translations, the vestibular system comprises two components: the semicircular canal system, which indicates rotational movements; and the otoliths, which indicates linear accelerations. The vestibular system sends signals primarily to the neural structures that control eye movements, and to the muscles that keep an animal upright. The projections to the former provide the anatomical basis of the vestibulo-ocular reflex, which is required for clear vision; and the projections to the muscles that control posture are necessary to keep an animal upright.

The brain uses information from the vestibular system in the head and from proprioception throughout the body to understand the body's dynamics and kinematics (including its position and acceleration) from moment to moment.

Auditory nerve

The cochlear nucleus in the brainstem receives the sound information from the cochlea which travels via the auditory nerve . From there, the signals are projected to the inferior colliculus in the midbrain tectum. The inferior colliculus integrates auditory input with limited input from other parts of the brain and is involved in subconscious reflexes such as the auditorystartle response.

The inferior colliculus in turn projects to the medial geniculate nucleus, a part of the thalamus where sound information is relayed to the primary auditory cortex in the temporal lobe. Sound is believed to first become consciously experienced at the primary auditory cortex. Around the primary auditory cortex lies Wernickes area, a cortical area involved in interpreting sounds that is necessary to understand spoken words.

Hearing problems may be caused due to the disturbances (such as stroke or trauma) at any of these levels, especially if the disturbance is bilateral. Auditory hallucinations or more complex difficulties in perceiving sound may also occure for the same in some instances.

1.3.4 Types of hearing loss

Hearing loss have been classified under various subgroups from various angles. Some categories are as follow:

1.3.4.1 Age of onset

Hearing impairment may occur since birth or it may be acquired at any age in life.

Thus depending on the age of onset we have two groups of hearing loss such as-

(A) Congenital hearing loss

(B) Adventitious hearing loss

(A) Congenital hearing loss

It refers to any hearing loss occurring prior to birth or at the time of birth. It may be hereditary or may develop during prenatal or natal period.

(B) Adventitious hearing loss

It means that who is born with normal hearing and has acquired speech but later lost hearing ability due to infection, disease or some damage to the hearing mechanism.

Another two types of hearing loss can be mentioned here. These are:

i) Pre-lingual hearing loss- The term pre-lingual hearing loss refers to that hearing loss developed prior or before the language development or language acquisition or language age. The hearing loss developed during the first three years of life is considered as pre-lingual.

ii) Post-lingual hearing loss- The term post-lingual hearing loss refers to that hearing loss developed after the language had developed significantly. Post-lingual hearing loss can be sudden or progressive in nature. The person with post-lingual hearing loss finds it more difficult to adjust and adapt to deafness as compared to pre-lingual deafened persons.

1.3.4.2 On the location of the problem

Hearing loss is also classified into three types depending upon the location of the hearing problem or defect. There are three types of problems-

(A) Conductive hearing loss

(B) Sensorineural hearing loss and

(C) Mixed hearing loss

(A) Conductive hearing loss

Hearing problems when are located in the outer ear and middle ear it is called Conductive hearing loss. Conductive loss of hearing is curable.

(B) Sensorineural hearing loss and

Sensorineural hearing loss takes place when hearing problems arise out of the defects in the inner ear.

(C) Mixed hearing loss

Combination of conductive loss and sensorineural loss is called Mixed hearing loss.

1.3.4.3 Nature of hearing impairment

On the basis of nature, hearing impairment can be classified as:

A) Gradual hearing impairment

B) Sudden hearing impairment

A) Gradual hearing impairment-

Gradual hearing impairment is also termed as "progressive hearing loss". This refers to a slow deterioration of hearing sensitivity with time. This may be due to any infection or hereditary disorder or aging. Conductive or mixed or sensori-neural hearing impairment can be gradual or progressive in nature.

B) Sudden hearing impairment

In Sudden hearing impairment, the patient over night may suffer partial or complete hearing loss in either one or both ears. This hearing loss results due to onetime insult to the auditory system. Usually the damage to the auditory system results in a permanent hearing loss. Sudden hearing impairment is usually always of sensori-neural type.

1.3.4.4 Degree of hearing impairment

An important consideration of any hearing loss is the degree of impairment. On the basis of degree hearing impairment classified into the following sub-groups. Hearing loss or hearing sensitivity is measured in decibels (dB).

Normal hearing sensitivity is -10 dB to 25 dB. Degree of Hearing Loss as per the Ministry of Welfare (Govt. of India), Notification No.4283HW, dt. 6.9.86 are given in the following table:

Level	Types of Impairment Impairment	dB Levels	Speech discrimination	Percentage of Impairment
I.	Mild Hearing Impairment	dB 26 to 40 dB in better ear	100% in better ear	Less than 40%
II.	Moderate Hearing Impairment	41 to 55 dB in better ear	50% to 80% in better ear	40% -50%
III.	Severe Hearing Impairment	50 to 70 dB hearing impairment in better ear	40 % to 50 %	50 % -75%
IV.	(a) Total deafness	No hearing	no discrimination	100%
	(b) Near total deafness	91 dB & above in better ear	- do-	100% 75%-100%
	(c) Profound hearing Loss	71 to 90 dB	Less than 40% in better ear	

Decibel (dB) means a unit of relative loudness of a sound. Zero decibels (0 dB) designate the point at which people with normal hearing can detect even the faintest sound. Each succeeding number of dB indicates a certain degree of hearing loss.

1.3.4.5 On the basis of cause

Hearing loss can be classified as Exogenous Hearing Impairment, Endogenous Hearing Impairment and Idiopathic hearing impairment.

(a) Exogenous Hearing Impairment

This refers to hearing loss caused by all factors other than heredity. These factors include:

- Prenatal causes (Cause before birth)
- Natal causes (Causes at the time of birth)
- Post natal causes (Causes after birth)
- Infections

- Noise
- Aging

(b) Endogenous Hearing Impairment

This includes only "heredity" as the causative factor for hearing loss. Hereditary hearing loss may be transmitted as a dominant or recessive characteristic.

(c) Idiopathic Hearing Impairment

This refers to hearing loss of an unknown pathology or cause i.e., the causes of hearing loss is unknown.

1.3.5 Impediment caused by different types of hearing loss

Due to different types of hearing loss, an individual faces various types of profound consequences life which are restricted below-

1. Socially handicapped
2. Problems in Personal & Social Development
3. Personality Problems
4. Psychological Problems
5. Linguistic Problems
6. Abnormal Emotional Behaviour

1. Socially handicapped

Hearing impaired children find it very difficult to adjust with the environment of the society. They suffer from personality disorders & slow temperament, withdrawl or submissiveness etc. They very often fail to understand what other people say due to which they face communication difficulties.

2. Problems in Personal & Social Development

Personal & social development problem is very common with the hearing impaired children. The main barrier for them for communicating with other is language-which affects the socialisation process and plays a vital role in their personal & social development. The most significant aspect of these children is their increased dependence on others which causes sense of inferiority.

3. Personality Problems

Studies show that hearing impaired children face some personality problems. Partial hearing children face more problem than the totally deaf children since partially deaf child gets more frustrated as he tries to reach the level of normals.

4. Psychological Problems

Hearing impaired children suffer from behavioural problems. They suffer from inferiority complex since they find themselves helpless in adapting to circumstances that require verbal communication. They compare themselves with their peers and also judge the attitude of society towards them. They feel that they are different from the normal children which hampers the growth and development of their personality.

5. Linguistic Problems

The deaf children face difficulty for acquisition of language since language is an auditory vocal process which leads to very slow linguistics development in them. These children have to receive visually while the normal children receive orally. They differ significantly from the normal children so far as language development is considered. These children have a limited vocabulary; they lack comprehension of complex word and words with multiple meaning and concept. Moreover, they are faced with difficulty in understanding complex structure of language and sometimes they have no language exposure.

6. Abnormal Emotional Behaviour

Young hearing impaired children very often show abnormal emotional behaviour like throwing something to attract to attention to them. Lack of comprehension may invite tension and resistance in them. They get irritated when they cannot make them understood.

1.3.6 Let us sum up

In our society, speech and language are critical avenues for effective education and socialization. To know about Hearing Impairment, it is very much essential to know the process of hearing, types of hearing loss and causes leading to different types of hearing loss.

Through our organ- Ear, we are able to acquire hearing, auditory perception, or audition to perceive sound by detecting vibrations, changes in the pressure of the surrounding medium through time, we may hear sound through solid, liquid, or gaseous matter. It is one of the traditional five senses; partial or total inability to hear is called hearing loss. To understand properly about the hearing loss, it is necessary to first understand the anatomy of the ear. The ear has three main parts:

the outer ear, the middle ear and the inner ear.

To understand properly about the hearing loss, it is necessary to first understand the anatomy of the ear. The ear has three main parts: the outer ear, the middle ear

and the inner ear. The external or outer ear is the outer most portion of the ear. It has two parts-(i) Pinna and (ii) Ear canal. The middle ear has two important parts - (i) Eardrum and (ii) Ossicles. The main three parts of the inner ear are (i) Cochlea, (ii) Vestibular system and (iii) Auditory nerve. Hearing loss has been classified under various subgroups from various angles. Some categories are as follow:

(i) On age of onset (ii) On the location of the problem (iii) Nature of hearing

impairment (iv) Degree of hearing impairment (v) On the basis of cause. Hearing loss or hearing sensitivity is measured in decibels (dB). Decibels (dB) mean a unit of relative loudness of a sound. Zero decibels (0 dB) designate the point at which people with normal hearing can detect even the faintest sound. Each succeeding number of dB indicates a certain degree of hearing loss. Normal hearing sensitivity is -10 dB to 25 dB. Due to different types of hearing loss, an individual faces various types of profound consequences which are restricted below-

1. Socially handicapped
2. Problems in Personal & Social Development
3. Personality Problems
4. Psychological Problems
5. Linguistic Problems
6. Abnormal Emotional Beh]aviour

1.3.7 ‘‘Check your of progress’’

1 How many parts are there in the Ear?

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.2 What is the function of ossicle?

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3 Write the name of main parts of the inner ear.

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4 What is the structure of cochlea?

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5 What is the value of normal hearing?

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1.4 □ Definition of hearing loss, demographics & associated terminologies: deaf/deafness/hearing impaired/disability/ handicapped

Structure

1.4.1 Introduction

Hearing is the main sensory pathway through which speech and verbal communication develop. A child is likely to speak incorrectly if he/she hears imperfectly. Hearing also influences learning and other aspects of maturation. So it is important for us to know about the normal hearing sensitivity .A normal hearing sensitivity means the person has no known pathology or known history of infection or any kind of disorder and without any kind of significant difficulties, is able to hear even the softest sound or whisper. Generally a normal hearing sensitivity level is -10 dB HL to 25 dB HL. the implications of an auditory impairment change due to change of situation and person. Different types of terms are used to describe the persons who are suffering from hearing problem. Speech and hearing experts generally use these terms interchangeably. This is not correct, because meaning of each term is different. So it is essential for us to know the meaning of these terminologies

1.4.2 Objectives

After going through this subunit the learners will be able to

- know the definition of hearing loss
- know about the different terminologies of hearing impairment
- know the steps involved in hearing process

1.4.3 Definition of hearing loss

Any degree of impairment of the ability to apprehend sound is called hearing loss. Hearing loss, also known as hearing impairment, is a partial or total inability to hear. It may occur in one or both ears .Hearing impaired are those in whom the sense of hearing is non functional for ordinary purposes of life. They do not hear/understand sound at all even with amplifier.

Hearing loss exists when there is diminished sensitivity to the sounds normally heard. The people who have relative insensitivity to sound in the speech frequencies come under the terms hearing impairment or hard of hearing.

According to the increase in volume above the usual level necessary before the listener can detect it the severity of a hearing loss is categorized.

Deafness is defined as a degree of loss such that a person is unable to understand speech even in the presence of amplification. In profound deafness, even the loudest sounds produced by an audiometer (an instrument used to measure hearing by producing pure tone sounds through a range of frequencies) may not be detected. In total deafness, no sounds at all, regardless of amplification or method of production, are heard.

Description

Sound can be measured accurately. The term decibel (dB) refers to an amount of energy moving sound from its source to our ears or to a microphone. A drop of more than 10 dB in the level of sound a person can hear is significant. Sound travels through a medium like air or water as waves of compression and rare faction. These waves are collected by the external ear and cause the tympanic membrane (ear drum) to vibrate. The chain of ossicles connected to the ear drum, the incus, malleus, and stapes carries the vibration to the oval window, increasing its amplitude 20times on the way. There the energy causes a standing wave in the watery liquid (endolymph) inside the organ of Corti. (A standing wave is one that does not move. A vibrating cup of coffee will demonstrate standing waves.) The configuration of the standing wave is determined by the frequency of the sound.

Many thousands of tiny nerve fibers detect the highs and lows of the standing wave and transmit their findings to the brain, which interprets the signals as sound. To summarize, sound energy passes through the air of the external ear, the bones of the middle ear and the liquid of the inner ear. It isthen translated into nerve impulses, sent to the brain through nerves and understood there as sound.
It follows that there are five steps in the hearing process:

- air conduction through the external ear to the ear drum
- bone conduction through the middle ear to the inner ear
- water conduction to the Organ of Corti
- nerve conduction into the brain
- interpretation by the brain.

If any problems arise in the ear in these steps due to anatomy and physiology of the ear or any problems in brain then comes hearing loss.

Hearing can be interrupted in several ways at each of the five steps.

Ear wax, foreign objects, infection, and tumors can block the external ear canal. Overgrowth of the bone, a condition that occurs when the ear canal has been flushed with cold water repeatedly for years, can also narrow the passage way, making blockage and infection more likely. The ear drum is so thin a physician can see through it into the middle ear. Sharp objects, pressure from an infection in the middle ear,even a firm cuffing or slapping of the ear, can rupture it. It is also susceptible to pressure changes during scuba diving.

Several conditions can diminish the mobility of the ossicles (small bones) in the middle ear. **Otitis media** (an infection in the middle ear) occurs when fluid cannot escape into the throat because of blockage of the eustachian tube. The fluid that accumulates, whether it be pusor just mucus and dampens the motion of the ossicles. A disease called **otosclerosis** can bind the stapes in the oval window and there by cause deafness.

All the conditions mentioned so far, that occur in the external and middle ear, are causes of conductive hearing loss. The second category, sensory hearing loss, refers to damage to the Organ of Corti and the acoustic nerve. The leading cause of sensory hearing loss is prolonged exposure to loud noise. A million people have this condition, many identified during the military draft and rejected as being unfit for duty. The cause is often believed to be prolonged exposure to rock music. The other leading cause of noise induced hearing loss (NIHL)is occupational noise exposure and is ample reason for wearing ear protection on the job.

A third group of people over 65 have sensory hearing loss due to **aging**. Both NIHL and presbycusis are primarily high frequency losses. In most language, it is the high frequency sounds that define speech, so these people hear plenty of noise, they just cannot easily make out what it means. They have particular trouble selecting out speech

from background noise. Brain infections like **meningitis**, drugs such as the aminoglycoside **antibiotics** (streptomycin, gentamycin, kanamycin, tobramycin), and Meniere's disease also cause permanent sensory hearing loss. Meniere's disease combines attacks of hearing loss with attacks of vertigo. The symptoms may occur together or separately. High doses of salicylates like **aspirin** and quinine can cause a temporary high frequency loss. Prolonged high doses can lead to permanent deafness. There is a hereditary form of sensory deafness and a congenital form most often caused by rubella (German **measles**). Sudden hearing loss—at least 30dB in less than three days is most commonly caused by cochleitis, a mysterious viral infection.

The final category of hearing loss is neural. Damage to the acoustic nerve and the parts of the brain that perform hearing are the most likely to produce permanent hearing loss. Strokes, multiple sclerosis, and acoustic neuromas are all possible causes of neural hearingloss. Hearing can also be diminished by extra sounds generated by the ear, most of them from the same kinds of disorders that cause diminished hearing. These sounds are referred to as **tinnitus** and can be ringing, blowing, clicking, or anything else that no one but the patient hears.

1.4.4 Deferent terminologies used in hearing impaired

The term "hearing loss" is used whenever specific reference is being made to a hearing impairment, which is of a particular intensity magnitude. It is measurement made on an audiometer and reported in decibels (dB).

Hearing Impairment is a genetic term referring to any organic hearing problem regardless of etiology or degree. It is a deviation or change for the worse in either structure or function which is usually outside the range of normal .It generally includes a broad range of hearing disability, which ranges in severity from mildly hearing impaired to profoundly deaf.

There is often confusion over the terms **"hearing impaired," "hard of hearing," "deaf,"** and **"deafened,"** both in definition and appropriateness of use.

'Hearing impairment', 'hearing disability' and **'hearing handicap'** are not synonymous term.

The term **"hearing impaired"** is often used to describe people with any degree of hearing loss, from mild to profound, including those who are deaf and those who are hard of hearing. Many individuals who are deaf or hard of hearing prefer the terms "deaf" and "hard of hearing," because they consider them to be more positive than the

term "hearing impaired," which implies a deficit or that something is wrong that makes a person less than whole.

"Deaf" usually refers to a hearing loss so severe that there is very little or no functional hearing.

"Hard of hearing" refers to a hearing loss where there may be enough residual hearing that an auditory device, such as a hearing aid or FM system, provides adequate assistance to process speech.

"Deafened" usually refers to a person who becomes deaf as an adult and, therefore, faces different challenges than those of a person who became deaf at birth or as a child.

Deaf, deafened, and hard of hearing individuals may choose to use hearing aids, cochlear implants, and/or other assistive listening devices to boost available hearing. Alternatively, or in addition, they may read lips, use sign language, sign language interpreters, and/or captioning.

People who are deaf or hard of hearing may have speech that is difficult to understand due to the inability to hear their own voice.

The term "**Deafness"** refers to hearing disabilities that preclude successful processing of linguistic information through audition, with or without a hearing aid.

The term **"hearing handicap"** refers to the effect of the hearing impairment on the person's everyday situations and the disadvantages imposed by the impairment sufficient enough to affect one's personal efficiency in the activities of daily living. Thus in other words, the influence of the hearing impairment is the hearing handicap. According to the definition adopted by Ministry of Social Justice and Empowerment, Govt. of India and Persons with Disability Act (P.W.D.-1995-96), "hearing handicap" refers to hearing loss of 60dB HL or more on the better ear.

1.4.5 Let us sum up

Hearing is the main source of development of speech and verbal communication. So it requires perfect hearing to develop a child properly. Normal hearing sensitivity means a person has no infection or disorder and is able to hear properly. Its level is –10dB HL to 25dB HL. Auditory impairment varies due to change of situation and person. Hearing loss means any degree of impairment. Hearing impaired person does not hear at all with the amplified speech. The severity of the hearing loss is categorized according to the increase in volume above normal level. Profound deafness means unable to detect the

loudest sounds and total deafness means no sounds at all. Unit of sound is decibel (dB). Sound energy passes through the air of the external ear, the bones of the middle ear and liquid of the inner ear. It is then translated into the nerve impulses which are sent to the brain through nerve. If any problem comes in the ear, hearing loss arises.The external ear canal can be blocked with ear wax, foreign objects, infections and tumor. Several conditions like Otitis media or otosclerosis can diminish the mobility of the ossicles in the middle ear and can cause deafness. Conductive hearing loss is caused due to all above conditions. Sensory hearing loss refers to damage to the organ of corti and acoustic nerve which is caused due to prolonged exposure to loud noise, aging, brain infection like meningities, drugs like aminoglycoside, meniere's disease, High doses of salicylate like aspirin and quinine etc. Neural hearing loss is caused due to strokes, multiple sclerosis and acoustic neuromas. Depending upon the hearing loss, different terms are –(i) hearing impaired,(ii) hard of hearing,(iii) deaf, (iv) deafened,(v) deafness and (vi)hearing handicap.

1.4.6 ''Check your progress''

1. What is the value of normal hearing sensitivity level?

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2. What is hearing loss?

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3. How many steps are involved in hearing process?

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4. What is Otitis Media?

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5. What do you mean by ‘Hard of hearing’?

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1.5 □ Challenges arising due to Congenital and acquired hearing loss

Structure

1.5.1 Introduction

The main sensory pathway through which speech and verbal communication develop is hearing. Due to imperfect hearing a child is likely to speak incorrectly. Again, hearing also influences learning and other aspects of maturation. Our knowledge of the world around us is reduced because of hearing impairment. It also adversely affects the child's performance in learning. The types of hearing loss are discussed in previous chapter. It is seen that congenital and acquired hearing loss comes under one type of hearing loss.

1.5.2 Objectives

After going through this sub unit, the learners will be able to:

- Understand the meaning of congenital and acquired hearing loss

- Understand the types of congenital hearing loss
- Understand the impact of hearing loss
- Know the challenges arises due to congenital and acquired hearing loss

1.5.3 Congenital hearing loss

Congenital hearing loss is any hearing loss that is present at birth. The cause can be genetic and hereditary, caused by issues during pregnancy or caused from an issue during the birthing process.

The causes of hearing loss and deafness can be divided into congenital causes and acquired causes.

1.5.3.1 Congenital causes

Congenital causes may lead to hearing loss being present at or acquired soon after birth. Hearing loss can be caused by hereditary and non-hereditary genetic factors or by certain complications during pregnancy and childbirth, including:

- maternal rubella, syphilis or certain other infections during pregnancy;
- low birth weight;
- birth asphyxia (a lack of oxygen at the time of birth);
- inappropriate use of particular drugs during pregnancy, such as aminoglycosides, cytotoxic drugs, antimalarial drugs and diuretics;
- severe jaundice in the neonatal period, which can damage the hearing nerve in a newborn infant.

  Hearing loss may occur if any part of the ear is defected. It may be before birth or after birth. If it is shown in birth time then it is called congenital hearing loss. There is a range of congenital ear, nose and throat problems - some occurring alone and others as part of a syndrome. The underlying causes are varied but, as with any congenital disorder, they can be broadly divided into chromosomal abnormalities (mutations and inherited problems), diseases associated with prenatal infection, maternal drug abuse, environmental factors, iatrogenic causes and abnormalities of unknown aetiology.

1.5.3.2 Types of Congenital causes

An abnormality of the **External Ear, Middle Ear & Inner Ear** may lead to congenital hearing loss. Various types of abnormality are shown in these types. Such as:

Anotia/microtia

Anotia is the total absence of the auricle, most often with narrowing or absence of the external auditory meatus. Strictly speaking, in microtia, there is some degree of malformation of the external ear (± narrowing or absence of the external auditory meatus) in contrast to a 'small ear' which is normally formed, as seen in Down's syndrome. These conditions may be unilateral or bilateral - the latter is less common.

Macrotia

This is a large but normally formed auricle, not usually associated with functional abnormality. It is defined as an ear which is two or more standard deviations from the mean. True macrotia is rare but may be seen in association with vascular malformations, hemihypertrophy, neurofibromatosis and secondary to haemangioma. It is more conspicuous if the ear is prominent too. Surgical correction can be carried out. The Antia-Buch technique, which involves freeing the helical flap and repositioning it, is the most commonly used procedure.

External auditory meatus atresia

Congenital atresia of the external auditory canal is caused by a failure of canalisation of the epithelial plug portion of the first bronchial cleft. This results in the formation of a membranous or bony (or both) plate at the level of the tympanic membrane. There may be associated ossicular malformations.

Abnormalities of the middle ear

In the absence of other problems, hearing loss associated with these abnormalities is often picked up during the course of routine infant and childhood audiological assessments. More specialist assessment and management is carried out in the ENT department.

Tympanic membrane abnormalities

The tympanic membrane may be small (eg, congenital rubella syndrome), distorted (eg, VATER syndrome [**V**ertebral anomalies, **A**nal atresia, **T**racheo-oesophageal fistula, (o) **E**sophageal atresia and **R**enal anomalies and radial dysplasia]) or replaced by fibrous tissue or a bony plate.

Ossicular abnormalities

- There are a number of different ossicular abnormalities, which may affect one or more of the ossicles.
- There may be absence of part or all of these bones and there can also be varying degrees of fusion.
- The associated intratympanic muscles are often affected and there can be an aberrant course of the facial nerve.
- Surgery can go some way towards correcting this.

Abnormalities of the tympanic cavity

Congenital cholesteatoma (2-3% of all cholesteatomas)

It is usually unilateral, may be bilateral, and presents as conductive hearing loss. The tympanic membrane is intact and overlies a white mass (this varies from a small pearl size to filling the entire middle ear) which can act as a source of infection. CT scanning to assess the lesion is advisable as this will dictate the surgical approach.

Vascular abnormalities

These include the presence in the middle-ear cavity of internal carotid artery aneurysms, jugular bulb abnormalities and very rare cases of an anomalous internal carotid artery. These vascular abnormalities tend to present with limited functional problems but a pulsatile red, smooth mass may be seen behind the tympanic membrane on examination. Their presence should be confirmed in a specialist unit, as it will have implications in considering any future intervention in.

Congenital perilymph fistula

This may occur, linking the perilymphatic space of the inner ear to the middle-ear cavity. There are often associated deformities. Children present with fluctuating and progressive sensorineural hearing loss ± tinnitus, vertigo and, occasionally, recurring meningitis. Diagnosis is confirmed on CT scanning and surgical correction can be carried out.

Abnormalities of the inner ear

The inner ear is the collection of structures within the bony labyrinth: the semicircular canals, the vestibule and the cochlea. Congenital abnormalities here are rare and will result in deafness in addition to possible dizziness, and account for up to 20% of children with sensorineural hearing loss.

People with abnormalities of the inner ear are at increased risk of developing recurrent meningitis or a perilymphatic fistula. Middle-ear infections should therefore be treated aggressively. There is also increased risk of developing cerebrospinal fluid leaks after minor head injuries and therefore it is advisable to avoid contact sports.

These deformities are typically classified according to embryonic developmental stages.

Any of the structures can be involved.

Cochleosaccular dysplasia is probably the most common form of inner-ear congenital deformity and is characterised by a collapse of the cochlear duct and saccule.

1.5.4 Acquired hearing loss

Acquired hearing loss is a hearing loss that appears after birth. The hearing loss can occur at any time in one's life due to illness or injury. The problems may occur in any part of the ear. Following are examples of conditions that can cause acquired hearing loss in children:

1.5.4.1 Acquired causes

Following are the acquired causes which may lead to hearing loss at any age :

- infectious diseases such as meningitis, measles and mumps, Encephalitis,
- Chicken pox, Flue;
- chronic ear infections;
- collection of fluid in the ear (otitis media);
- use of particular drugs, such as some antibiotic and antimalarial medicines;
- injury to the head or ear;
- excessive noise, including occupational noise such as that from machinery and explosions, and recreational noise such as that from personal audio devices, concerts, nightclubs, bars and sporting events;
- ageing, in particular due to degeneration of sensory cells;
- wax or foreign bodies blocking the ear canal.

Chronic otitis media is the leading cause of hearing loss among children,

In the previous unit it is known that on the location of the problem, hearing loss is also classified into three types. These are

- Conductive loss

- Sensorineural hearing loss and
- Mixed hearing loss

These three types of hearing losses are common for congenital hearing loss and acquired hearing loss. It can vary in degrees of severity and occur in all age groups; however, the elderly are most commonly the hearing impaired. Hearing is broken up into two different parts:

- The conduction of the sound and
- The nerve processing of the sound.

On the basis of anatomy and the place of problem the distinction is made.

- **Conductive Loss:** Problems with sound waves travelling to the cochlear (the external and middle ear)
- **Sensorineural Loss:** Nerve related problems involving the cochlear and the inner ear
- **Mixed hearing loss:** Is a combination of both conductive and sensorineural hearing loss at the same time. Both the middle and inner ear are involved.

1.5.5 Challenges

Hearing and speech are essential tools of learning, playing and developing social skills for a child. Children learn to communicate by imitating the sounds they hear. If they have a hearing loss which is undetected and untreated, they can miss much of the speech and language around them. This results in delayed speech/language development, social problems and academic difficulties. These children score a relatively low score on IQ testing. In general their performance in academic subjects of the school is also poor. They face difficulty in personal-social adjustment.

1.5.5.1 Impact of hearing loss

Functional impact

Individual's poor ability to communicate with others is one of the main impacts of hearing loss. Spoken language development is often delayed in children with deafness.

On the academic performance of children hearing loss and ear diseases such as otitis media can have a significantly adverse effect. However, when opportunities are provided for people with hearing loss to communicate, they can participate on an equal basis

with others. The communication may be through spoken/-written language or through sign language.

Social and emotional impact

Limited access to services and exclusion from communication can have a significant impact on everyday life, causing feelings of loneliness, isolation and frustration, particularly among older people with hearing loss.

If a person with congenital deafness has not been given the opportunity to learn sign language as a child, he or she may feel excluded from social interaction.

Economic impact

Children with hearing loss and deafness rarely receive any schooling in developing countries. Adults with hearing loss also have a much higher unemployment rate. A higher percentage of people with hearing loss among those who are employed, are in the lower grades of employment compared with the general workforce. Unemployment rates among this group will decrease by improving access to education and vocational rehabilitation services, and raising awareness especially among employers about the needs of people with hearing loss.

Hearing loss substantially affects social and economic development in communities and countries also in addition to the economic impact of hearing loss at an individual level.

1.5.5.2 Challenges arising due to congenital hearing loss

In congenital hearing loss child has not acquired the basic language and speech patterns which are required in intellectual functioning, academic success and social adjustment.

Congenital hearing loss is associated with certain behavioural problems. In adapting to circumstances that requires verbal communication the H.I (hearing impaired) children feel invariable inferior and helpless. They have a poor self concept which damages the development of personality (Loeb and Saregiani, 1986).

Language development of the congenitally deaf children differs markedly from that of the normal. In fact, the normal child learns the language, but the HI child is taught language. They process language and linguistic utterances visually.

In congenital hearing loss cognitive functioning also does not develop. They face difficulty in understanding abstracts concepts. They possess poor comprehension ability because of limited vocabulary.

In case of congenital hearing loss of mild or moderate level, child can achieve his/her goal with the help of proper guidance, treatment and use of proper devices. But in case of severe or profound level child cannot progress according to his/her goals.

In case of congenital sensori-neural hearing loss, child faces many problems in various areas such as academic, social etc.

1.5.5.3 Challenges arising due to acquired hearing loss

In addition to the challenges discussed in the case of congenital hearing loss, acquired hearing loss children may face following challenges.

Acquired hearing loss is of two types- (i) Pre-lingual and (ii) Post-lingual. If a child suffers from hearing loss before he/she has achieved basic competency in his or her primary language (i.e. occurring before age 3 years (Schein, 1987) then it is called Pre lingual hearing loss. Whereas post lingual hearing loss is that which occurs after the basic acquisition of language i.e.in later childhood or adulthood (Vernon and Andrews, 1990).

At the age of one year or a little more, a child with normal hearing begins to speak and he or she acquires many pre-verbal skills (skills that are learned by the child before acquiring speech and language). Also develops a significant amount of receptive language (understanding of language) in the first year of life. A child with hearing impairment does not get a chance to learn many of the pre-verbal skills (for e.g. imitation of voice) since the development of these skill is related to hearing and thus begins to lag behind average children of the same age.

As the development of many of the pre-verbal skills (for e.g. imitation of voice) is related to hearing ,a child with hearing impairment does not get a chance to learn these skills and thus begins to lag behind average children of the same age. After the stage of learning basic language if a child develops a hearing loss he or she would have an advantage over a child who has had hearing loss pre-lingually. However, children with post –lingual hearing loss is at risk for losing language and speech skills that they have acquired if proper care is not taken for him in advance.

1.5.6 Let us sum up

Speech and verbal communication of a child is developed on the basis of hearing capacity. Effect of poor hearing may affect his speaking, learning and performance. Congenital hearing loss is any hearing loss being present or acquired soon after the birth due to

genetic factors or by certain complication during pregnancy and child birth. An abnormality of the external ear, middle ear and inner ear may lead to congenital hearing loss. Acquired hearing loss is a hearing loss that appears after birth which may occur at any time in any part of the ear due to illness or injury. Hearing loss is classified into three types – (i) Conductive loss, (ii) Sensorineural loss and (iii) Mixed hearing loss. If a child is having any hearing loss problem which is not detected and treated, then there may be great impact which may result in delayed speech/ language development, social problems and academic difficulties. He may face personal – social adjustment. Moreover, there may be functional impact, emotional impact as well as economic impact on his life due to this. In addition to different impacts of hearing loss at an individual level, hearing loss substantially affects the social and economic development in communities and countries. In congenital hearing loss, child does not acquire language and speech patterns which are required in intellectual functioning, academic success and social adjustment. Due to this he/she suffers from inferiority complex and feels helpless which affects his/ her day to day life. Acquired hearing loss is of two types – (i) Pre- lingual and (ii) Post- lingual. Pre- lingual hearing loss is that which occurs before the child has achieved basic competency in his/ her primary language. Post- lingual hearing loss is that which occurs after the basic acquisition of language. Apart from speaking at the age of one year, a normal hearing child acquire many pre- verbal skills which is not possible for a child with hearing loss and thus lag behind the average child of his age. However, child with post –lingual hearing loss is at risk for loosing language and speech skills that acquired if proper care is not taken for him in time.

1.5.6 ''Check your progress''

1. What do you mean by congenital hearing loss?

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2. Write two types of abnormality for congenital causes.

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3. What do you mean by tympanic membrane abnormality?

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4. What is the leading cause of hearing loss among children?

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5. Write down one challenge arising due to acquired hearing loss?

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