



“PEDIATRIC EAR DISEASES”- AN OVERVIEW

ENT

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ABSTRACT

Pediatric ear diseases form a majority of ear diseases presenting to the ENT OPDs. Most important among them are Acute otitis media [AOM], Otitis Media with Effusion [OME]. These two diseases form a major burden for Permanent childhood Hearing Impairment. Other diseases conditions like Wax, Otitis externa include Otomycosis for a major share of the pediatric ear cases. Foreignbody, trauma, CSOM also elaborate the list. In view of importance of pediatric ear disease which can cause a morbidity by affecting the hearing status and its impact on the productivity via education and societal burden, our study was planned. Most common ear conditions, their presentations and management protocols are discussed in the study. **Aim:** To study various ear diseases in pediatric age group. **Patients And Methods:** A total of 300 patients were included who fulfilled the inclusion criteria. **Results:** The mean age was 8.7 ± 4.6 years consisting of 46% females and 54% males. In the study 37.4% had right ear involvement, 31% had left ear and 36% had bilateral involvement. Among the 300 subjects 54% had ear diseases and on comparison with age a significant association was seen between them especially the children between 102.8 \pm 52.3 months. **Conclusion:** The most common diseases were impacted wax, otitis externa, ASOM and CSOM among the pediatric population attending ENT OPD.

KEYWORDS

Ear diseases, Pediatric ear cases, Ear, Childhood ASOM, CSOM, wax, cholesteatoma, Otomycosis

INTRODUCTION:

Ear infections in children are a major health problem and may be associated with hearing impairment, delayed speech and language development and academic and educational development.^{1,2,3} They are a major public health problem in developing countries. They are a burden on the health system and account for almost one third of healthcare visits made to pediatricians, especially in the first five years of life.^{4,5}

The most commonly identified ear infection is known as acute otitis media which is caused by swelling and infection in the middle ear.⁶ Chronic ear infections can affect a child's ability to learn and consequently may have a lifelong impact on his/her quality of life and overall development.^{7,8} It is estimated that almost all children will have had an ear infection by the age of five years. It was also reported that the rates of ear infection declined over the years 1994/1995 to 2008/2009 due to the reduction in exposure to secondhand smoke.⁹ In general, ear infections are mild and resolve by themselves over a short period of time; however, if left untreated, this infection could lead to hearing loss, in the future. Thus clinical assessment is important in managing the condition.^{10,11}

Risk factors for ear infections include younger maternal age, male sex, younger age, low birth weight, low socioeconomic status, daycare attendance, inadequate housing conditions, lack of access to health care, exposure to cigarette smoking, and mothers who smoke during pregnancy. It was also noted that breastfed children were less likely to experience ear infection.^{12,13,14,15}

The term "Otitis Media" (OM) includes a range of conditions, mostly

characterized by inflammation of the middle ear with common symptoms of pain, irritability and fever. Infections, allergies and environmental factors contribute to the occurrence of otitis media with bacterial or viral aetiology. Many risk factors can predispose children to develop acute otitis media like preceding upper respiratory tract infection and genetic factors.

Acute otitis media can occur at any age, but it is most common in the age group of 6 to 24 months. Around 80 per cent of all children would experience a case of otitis media during life time^{16,17,18,19,20}

The common ear diseases are:

- 1) Suppurative otitis media
 - a. Acute suppurative otitis media (ASOM)
 - b. Chronic suppurative otitis media (CSOM)
- 2) Non-suppurative otitis media (NSOM)
- 3) Impacted cerumen (wax plug)
- 4) Diffuse Otitis externa
- 5) Furunculosis (localized form of otitis externa resulting from infection of a single hair follicle)
- 6) Otomycosis

All these conditions may lead to the development of severe form. Suppurative otitis media is associated with life-threatening

complications. ASOM leads to hearing loss (mild or greater). Disabling hearing loss corresponds to hearing loss greater than 30 dB in the better hearing ear in children (0 to 14 years).

In India six per cent of the population is reported to have hearing loss. In children hearing loss can negatively impact many aspects of life such as communication, the development of language and speech cognition, education and mental health. Cost-effective interventions can alleviate these overwhelming costs associated with hearing loss. Some 10% of children have impacted cerumen. CSOM is one of the commonest infectious diseases of childhood.^{21,22} In 2013, the evidence-based guidelines for the diagnosis and management of acute otitis media were updated by the American Academy of Paediatrics, accentuating the role of clear visualization of the tympanic membrane in the diagnosis of ear infections.²³

Otitis media is clinically diagnosed through physical exam (otoscopy) combining the history of the patient with presenting signs and symptoms. The diagnostic tools for Otitis Media available are pneumatic otoscope, acoustic reflectometry and tympanometry. Pneumatic otoscopy is considered better than other modalities to facilitate diagnosis.²⁴

Suppurative otitis media can result in complications such as meningitis, brain abscess, mastoiditis, hearing loss and others. Children having recurrent episodes with severe symptoms or complications of AOM may require immediate otolaryngologic evaluation and surgical treatment. Antibiotics are prescribed for AOM more frequently than for any other illness of childhood.^{25,26,27}

AIM AND OBJECTIVES

Aim: To study various ear diseases in pediatric age group

Objectives:

1. To estimate prevalence of ear diseases in pediatric age group
2. To evaluate the trend and pattern of pediatric ear diseases
3. To analyze various ear diseases and their patterns in pediatric patients
4. To formulate better treatment options for pediatric ear disease

PATIENTS AND METHODS

Study Place

The study was conducted among patients attending Department of ENT (Otorhinolaryngology), Bhaskar medical college and hospital, Moinabad, Telangana

Study Design

- Prospective cross-sectional study

Study Period

- July 2022 to January 2024

Ethical Approval

- Institutional ethical committee approval was obtained prior to the initiation of the study

Study Population

- All Pediatric patients with signs and symptoms of ear infections

Inclusion Criteria

1. Patients of either sex aged <16 years.
2. Pain
3. Discharge
4. Decreased hearing
5. Ringing sensation
6. Swelling in and around
7. Trauma

Exclusion Criteria

1. Patients >16 years
2. Dizziness due to other than ear diseases
3. <6 months post-operative cases of ear surgeries
4. Congenital abnormalities
5. Tumors

Sample Size

The minimum sample size required was 294 patients with the help of a statistical formula. A total of 300 patients were included.

Study Methods

- To be eligible for enrolment, each patient underwent screening.
- Once informed consent was given and their sociodemographic data was obtained, the individuals who fit the study requirements were informed about the nature and goal of the research.
- To gather information about the patients and their outcomes, a research proforma was utilized.
- All the patients who presented with signs and symptoms suggesting ear infection/ disease based on a guided history taking and specific physical examination.
- Patients will be asked about the onset of the disease, the episodes they get annually, and whether they had ear surgery.
- After confirming the diagnosis, the patients were managed accordingly.
- Investigations done were:
Oto-endoscopy, PTA, OAE, BERA

Statistical Analysis Plan

- The data was collected, coded, entered into Microsoft excel work sheet and exported to SPSS.
- Data was analyzed using statistical package for social sciences (SPSS) version 26.
- The results are presented as tables and diagrams
- Qualitative data is represented as frequencies, total and percentages and quantitative data is presented as mean and standard deviations.
- To determine the association between age and ear manifestations Chi-square and independent t test was used.
- P-value less than 0.05 is considered as significant.

RESULTS

Table 1: Distribution According To Age

Age	Frequency	Percent
<1 year	14	4.6%
1-3 years	37	12.4%
3 - 6 years	56	18.6%
6 - 9 years	57	19%
9 - 12 years	58	19.4%
12 - 16 years	78	26%
Total	300	100%
Mean age: 105.1± 55.9 months		

Table 1- shows the age distribution where 4.6% were <1 year, 12.4% were between 1- 3 years, 18.6% were between 3 to 6 years, 19% were between 6 and 9 years, 19.4% were between 9 - 12 years and 26% were between 12 to 16 years. The mean age in the study was 8.7± 4.6 years (105.1±55.9 months).

Table 2: Gender Distribution

Gender	Frequency	Percent
Male	162	54%
Female	138	46%
Total	300	100%
Sex ratio: 1.2: 1 [M: F]		

The study consisted of 162 (54%) males and 138 (46%) females with the sex ratio being 1.2: 1 [M: F] as shown in table 2.

Table 3: Distribution According To Socioeconomic Status

SES	Frequency	Percent
Upper class	3	1%
Upper middle class	30	10%
Middle class	51	17%
Lower middle class	201	67%
Lower class	15	5%
Total	300	100%

Table 3 shows the socioeconomic status according to modified B. G Prasad classification where 17% belonged to lower- middle class followed by 17% were middle class, 10% were upper middle class, 5% were lower class and 1% were upper class.

Table 4: Frequency Of Manifestations (n= 300)

Manifestations	Frequency	percent
Impacted wax	136	45.3%
Otitis externa	54	18%
ASOM	51	17%
CSOM	35	11.6%

Foreign body	9	3%
OME	18	6%
Referred otalgia	5	1.7%
ETD	2	0.6%
Furuncle	2	0.6%
Trauma	1	0.3%
Otomycosis	1	0.3%

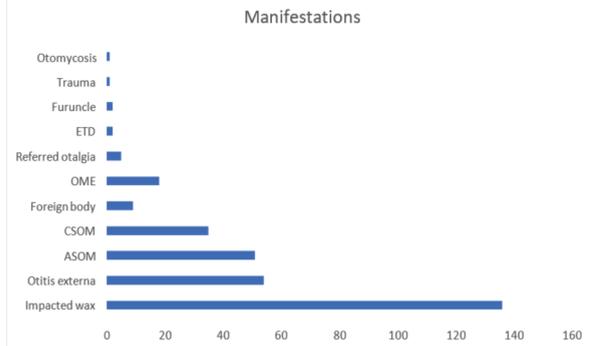


Figure 1: Bar Chart Showing Ear Manifestations

Among the 300 subjects the most common manifestation seen was impacted wax (45.3%) followed by Otitis externa (18%), ASOM (17%), CSOM (11.6%) and the other manifestations are as shown in table 5.

Table 5: Distribution According To Laterality

Laterality	Frequency	Percent
Right ear	112	37.4%
Left ear	93	31%
Bilateral	108	36%

With regard to side manifestation, 112 (37.4%) of the subjects had right ear involvement, 93 (31%) had left ear involvement and 108 (36%) subjects had bilateral involvement as seen in table 6.

Table 6: Ear Manifestations

Manifestations	Unilateral	Bilateral
Impacted wax	49 (23.9%)	87 (80.5%)
Otitis externa	54 (26.3%)	0
ASOM	43 (20.9%)	8 (7.4%)
CSOM	24 (11.7%)	11 (10.1%)
Foreign body	9 (4.4%)	-
OME	18 (8.7%)	-
Referred otalgia	4 (1.9%)	1 (0.9%)
ETD	1 (0.4%)	1 (0.9%)
Furuncle	2 (0.9%)	-
Trauma	1 (0.4%)	-
Otomycosis	1 (0.4%)	-
Total	205	108

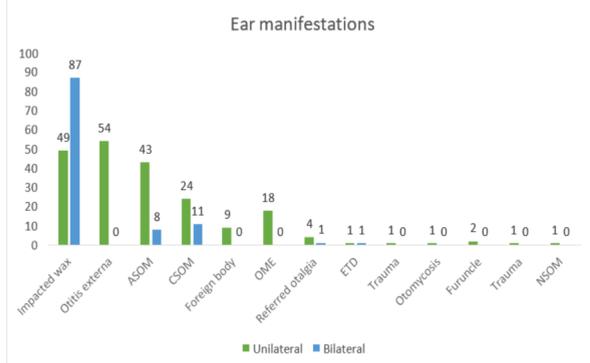


Figure 2: Column Chart Showing Ear Manifestations

Among the 300 subjects 205 had unilateral manifestations which was mainly impacted wax (23.9%), otitis media (26.3%), ASOM (20.9%), CSOM (11.7%) and otomycosis (8.7%) and 108 had bilateral manifestations which was majorly impacted wax (80.5%), and CSOM (10.1%).

Table 7: Distribution According To Presence Of Ear Disease

Ear disease	Frequency	Percent
Yes	162	54%
No	138	46%
Total	300	100%

In the study the prevalence of ear diseases among the paediatric population was 54% as shown in table 7.

Table 8: Distribution According To Type Of Treatment

Treatment	Frequency	Percent
Medical	261	87%
Surgically	39	13%
Total	300	100%

Table 9 shows 261 (91%) subjects were treated medically and 39 (13%) subjects required surgery.

Table 9: Association Between Age And Ear Diseases

Disease	Mean age	SD	95% CI		p-value
			Lower	Upper	
Yes	102.8	52.3	17.6	7.8	0.03*
No	107.7	60.04	17.8	8.02	

In the study when the presence of ear disease was compared with age for association, a statistically significant (p= 0.03) association was seen between them suggesting the age group between 102.8± 52.3 months are prone to various ear diseases.

DISCUSSION

Age:

In this study, 4.6% were <1 year, 12.4% were between 1- 3 years, 18.6% were between 3 to 6 years, 19% were between 6 and 9 years, 19.4% were between 9- 12 years and 26% were between 12 to 16 years. The mean age in the study was 8.7± 4.6 years (105.1± 55.9 months).

The present study findings were similar to a study by Chaudhari BK et al in which 33.1% were 0 – 4 years age, 37.6% were 5 – 9 years and 29.3% were 10 – 16 years of age.²⁹

The present study findings concurred with a study by Surapaneni H et al in which 13.9% were in the age group of 0 – 2 years, 31.2% were in the age group of 2 – 5 years and 54.9% were in the age group of 6 – 15 years.³⁰

The present study findings were similar to a study by Yeli S et al in which 44% of children were in the age group of 6 – 14 years.³¹

The present study findings were comparable to a study by Nepali R et al in which 43.6% were in the age group of 1 – 9 years.³²

The present study findings were similar to a study by Acharya A et al in which mean age of children was 9.8 years.³³

Gender Distribution:

In the present study, 54% were males and 46% were females with the sex ratio being 1.2: 1 [M: F].

The present study findings were similar to a study by Chaudhari BK et al in which 65.4% were males and 34.6% were females.²⁹

The present study findings differed with a study by Surapaneni H et al in which 61.9% were females and 38.1% were males.³⁰

The present study findings differed with a study by Yeli S et al in which 58.56% were females and 41.4% were males.³¹

The present study findings were comparable to a study by Nepali R et al in which 60% were males and 40% were females.³²

The present study findings were similar to a study by Acharya A et al in which M: F ratio was 0.99:1.³³

Socioeconomic Status:

According to this study most of the patients reported belong to lower middle class, followed by middle class.

Laterality Of The Disease:

In this study, 37.4% of the subjects had right ear involvement, 31% had

left ear involvement and 36% subjects had bilateral involvement.

Frequency Of The Diseases:

In the present study, the spectrum of ear diseases showed that 68.3% had unilateral manifestations and 36% had bilateral manifestations. The most common was bilateral impacted wax (29%), followed by otitis externa (18%). Around 16.3% had unilateral impacted wax, 14.3% had unilateral ASOM, 8% had unilateral CSOM, 6% had OME, 3.6% had bilateral CSOM, 2.6% had bilateral ASOM. Around 3% of subjects reported foreign body in ear, and the other clinical presentations were referred otalgia, furuncle and trauma.

The present study findings were similar to a study by **Chaudhari BK et al** in which the spectrum of Ear disorders reported were chronic suppurative otitis media (CSOM) -13%, Otitis media with effusion (OME) -11.7%, acute otitis media (AOM) -10.1%, otomycosis with otitis externa - 6.1%, wax - 3.7%, foreign body ear (FB ear) -1.1%.²²

The present study findings concurred with a study by **Surapaneni H et al** in which chronic suppurative otitis media (27.1%) was the most common disorder. Otitis media with effusion (10.1%), otomycosis (2.9%), Foreign body ear (1.9%) and ear wax (8.9%) of the ear diseases were the other reported ear disorders.²³

The present study findings were similar with a study by **Yeli S et al** in which most common ontological diseases presented were acute otitis media (AOM) (42.9%) followed by otitis media effusion (OME) (20.6%) and impacted wax (19.4%). Other Ear diseases included ear piercing, otitis externa, mastoid abscess, pre auricular sinus etc.²⁴

The present study findings were comparable to a study by **Nepali R et al** in which most common otologic disorder was ear wax (40.9%) followed by chronic suppurative otitis media (35.7%). Middle ear effusion (15.4%), otomycosis (4.7%), Foreign Body in the ear (2.3%) were other reported ear morbidities in children.²⁵

The present study findings were similar to a study by **Acharya A et al** in which impacted wax, chronic suppurative otitis media, otitis media with effusion, eustachian tube dysfunction, otomycosis and otitis externa were the ear morbidities reported among government school children.²⁶

The present study findings were comparable to a study by **Briggs DC et al** in which pattern of paediatric ENT disorders was Cerumen auris (16.9%), Otitis Externa (10.2%); Otomycosis (8.5%); Acute Otitis Media (7.9%) and Chronic Suppurative Otitis Media (5.9%).²⁷

The present study findings were consistent with a study by **MM Haque et al** in which 33.6% had impacted wax, 18.7% had CSOM and 13.8% had ASOM. Around 11.6% had OME, 7.6% had Otitis externa and 5.1% had otomycosis. Almost 3.6% had foreign body in ear and 2.5% had preauricular sinus.²⁸

The present study findings were similar to a study by **Gupta DK et al** in which 37.45% reported ear wax and 21.3% reported foreign body.²⁹

The present study findings corroborated with a study by **Thakur SK et al** in which impacted Ear wax (45.76%) and otitis media with effusion (16.79%) were the commonest ear diseases. Chronic otitis media (8.18%), Otomycosis (11.51%), otitis externa (1.19%), acute Otitis media (8.84%), Eustachian tube dysfunction (6.84%), Perichondritis (0.29%), Foreign body in the ear (0.15%), Preauricular sinus (0.15%) and sensorineural hearing loss (0.29%) were also reported in the spectrum of ear diseases among children.³⁰

Chadha SK et al reported cerumen impaction (7.5%) and chronic suppurative otitis media (3.6%) as most common morbidities among children in Delhi. The other ear diseases were otitis media with effusion (2%) and had otitis externa (bacterial and fungal) – 0.96%.³¹

Renjit RE et al reported that the most prevalent external ear disease was impacted wax (40.76%) of children. Eustachian tube dysfunction without middle ear effusion (2.8%), acute otitis media, chronic suppurative otitis media and otitis media with effusion were other ear morbidities. Hearing impairment was reported in 2.22% of cases.³²

Prevalence Of Ear Diseases In Pediatric Patients:

In this study, the prevalence of ear diseases among the pediatric

population was 54%.

The present study findings differed with a study by **Surapaneni H et al** in which prevalence of ear diseases was 22.1%.²³

The present study findings were similar to a study by **Yeli S et al** in which prevalence of ear problems was 50.24%.²⁴

The present study findings were comparable to a study by **Nepali R et al** in which prevalence of ear diseases was 57.8%.²⁵

The present study findings were comparable to a study by **Briggs DC et al** in which prevalence of Ear diseases was found to be 65.1%.²⁶ The present study findings were consistent with a study by **MM Haque et al** in which prevalence of ear diseases among paediatric age group was 45.6%.²⁸

The present study findings corroborated with a study by **Thakur SK et al** in which prevalence of ear diseases was 36.09%.³⁰

The present study findings were similar to a study by **Ebenezer R et al** in which prevalence of ear diseases among children in South Kerala was found to be 44.54%.³²

Association Between Age And Ear Disease:

In the present study when the presence of ear disease was compared with age for association, a statistically significant ($p=0.03$) association was seen between them suggesting the age group between 102.8± 52.3 months are prone to various ear diseases.

The present study findings concurred with a study by **Surapaneni H et al** in which children in the age group of 6- 15 years were significantly associated with ear diseases.²⁵

The present study findings were similar to a study by **Acharya A et al** in which children in the age group of 7-9 years were significantly associated with ear morbidities.²⁶

The present study findings were comparable to a study by **Briggs DC et al** in which age groups 0- 4 years were most affected with ear diseases.²⁷

The present study findings were consistent with a study by **MM Haque et al** in which 6-10 years of age group had higher prevalence of ear diseases and this association was found to be statistically significant.²⁸

SUMMARY & CONCLUSION

The present prospective cross-sectional study was undertaken with an aim to study various ear diseases prevalent in pediatric age group. It was done between July 2022 and January 2024. A total of 300 patients were included who fulfilled the inclusion criteria. The study started following ethics clearance.

The results of the study were, the mean age was 8.7± 4.6 years consisting of 46% females and 54% males.

In the study 37.4% had right ear involvement, 31% had left ear and 36% had bilateral involvement.

The most common diseases were impacted wax, otitis externa, ASOM and CSOM among the pediatric population attending ENT OPD.

Among the 300 subjects 54% had ear diseases and on comparison with age a significant association was seen between them especially the children between 102.8± 52.3 months.

LIMITATIONS

1. Small sample size
2. There could be an element of information bias in this study.
3. Limited previously conducted studies.
4. Lack of follow up
5. Including many conditions for follow up
6. Audiometric analysis could not be done for all

RECOMMENDATIONS

1. Identification of risk/ triggering factors
2. Reduce the incidence
3. Early diagnosis

4. Early intervention
5. Reduce further complications
6. Educate the parents & school teachers about paediatric ear discharge

Conflict Of Interest : There is no conflict of interest

Funds: The institute has supported us in getting the patients in was done during routine patient care

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